

AN INTRODUCTORY PSYCHOLOGY

READ

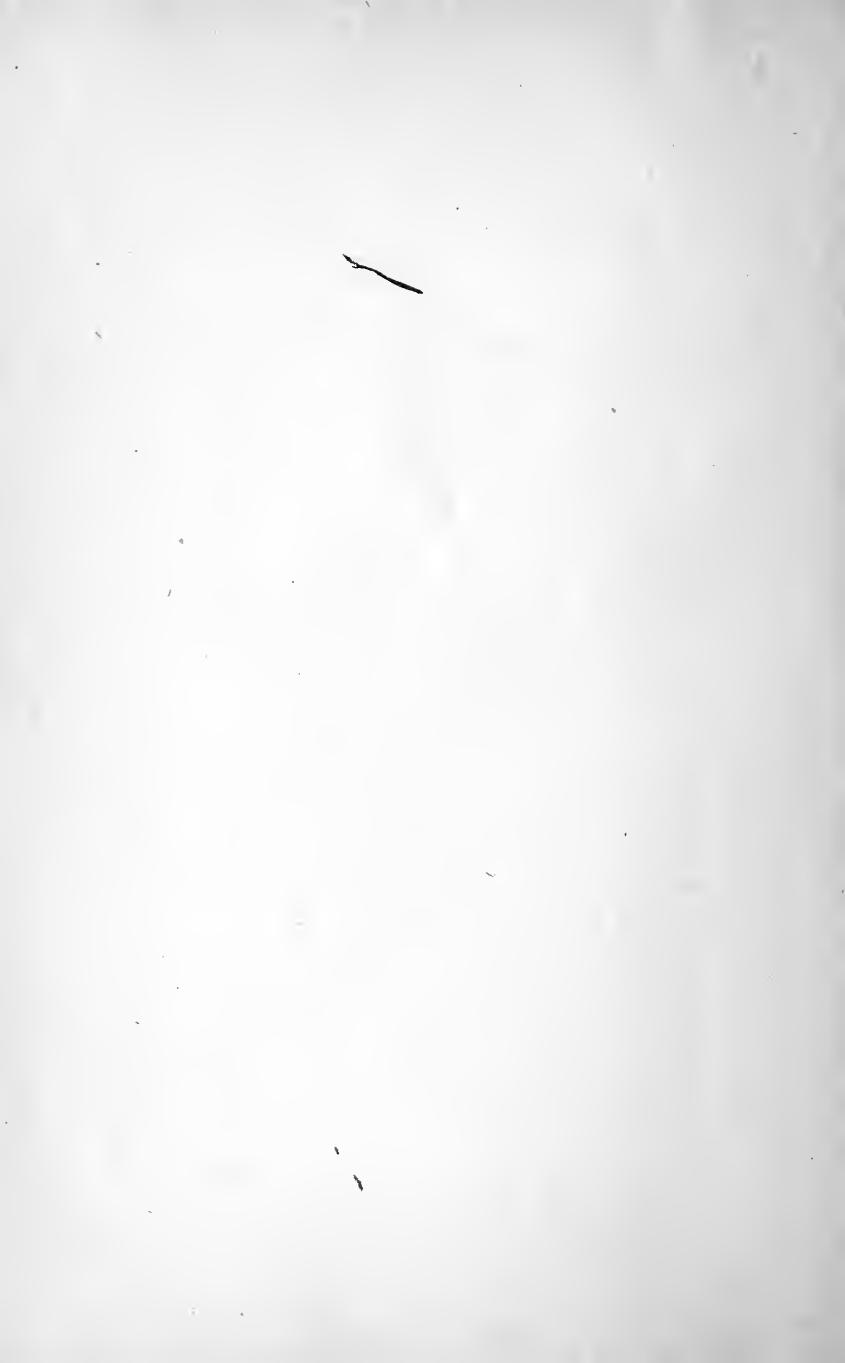


Class BF131

Book R35

Copyright N^o

COPYRIGHT DEPOSIT.



AN
INTRODUCTORY PSYCHOLOGY

WITH SOME EDUCATIONAL APPLICATIONS

BY
MELBOURNE STUART READ, PH.D. (CORNELL)
PROFESSOR OF PSYCHOLOGY AND EDUCATION IN
COLGATE UNIVERSITY

2 1 3
2 2 1
2 3 0

GINN AND COMPANY
BOSTON · NEW YORK · CHICAGO · LONDON

COPYRIGHT, 1911, BY MELBOURNE S. READ

ENTERED AT STATIONERS' HALL

ALL RIGHTS RESERVED

911.3

BF131
R35

The Athenæum Press

GINN AND COMPANY • PROPRIETORS • BOSTON • U.S.A.

\$ 1.00

©CL A 292167

PREFACE

It has long been the belief of the writer that the main truths of the science of psychology could be presented in a very simple, straightforward, and interesting fashion, and this book attempts to be such a presentation. Many elementary works on psychology are so technical, and apparently conceived so little from the student's point of view, that the beginner is repelled rather than attracted. Such books give the impression that they deal with something abstruse and far away from one's ordinary concerns, rather than with one's own intimate experience.

It is not necessary to state that in this book no attempt has been made to add to the body of scientific knowledge on the subject. The material presented is for the most part the common property of psychologists. The work of the author has been, rather, one of selection, emphasis, and presentation. Selection has been made of the more important features of the structure and functioning of the mind considered as a part of a psychophysical organism adjusting itself to the conditions of its life. The book attempts to lay the greater emphasis on those parts of the matters selected for treatment which will be most serviceable to the student in his early efforts to understand the mental or personal side of life's adjustments. The presentation tries to make clear what has thus been selected and emphasized, and to bring these matters into close relation with the reader's experience. It is the student's own experience which it is hoped

the book will better enable him to understand. The writer has assumed a reader intelligently interested in such matters.

Practical applications are now made much of in teaching every science, because they are useful in life and most helpful in clearing up a subject and fixing it in the mind of the student. The greatest field for the practical application of psychology is in the learning and teaching processes, and this book makes free use of these applications which are valuable for every student of psychology and directly available for the prospective teacher.

The writer is of the belief that at the beginning of the study there is little value in the differentiation of psychology into such types as functional and structural, for both aspects of the description and explanation of mental life seem natural and harmonious to the beginner if the differentiation is ignored. This book, accordingly, attempts to tell its "plain tale" regardless of such distinctions, yet makes use of the contributions of both types of psychological treatment. It aims to give in due measure the results of laboratory experimentation, and of introspection and observation not of the laboratory type. But the book is based frankly on experienced mental events, and the generalizations are in accord with the results of actual observation. Considerable space is given to the physiological aspects of the subject, and the results of investigation in child psychology and other differentiated branches are not neglected.

The author is under especial obligation to Professors Hough and Sedgwick for permission to use cuts from their book, "The Human Mechanism."

M. S. R.

HAMILTON, N. Y.

CONTENTS

CHAPTER	PAGE
I. INTRODUCTION	1
The nature of mental facts	1
How mental facts are obtained	5
Problems of psychology	8
Practical applications of psychology	12
Psychology and the teacher	13
II. THE GENERAL NATURE OF CONSCIOUSNESS	17
The function of consciousness	18
Consciousness in constant change	19
Conscious states connected and personal	20
Consciousness selective	21
The mental elements	23
Mental development	27
III. THE NERVOUS SYSTEM	32
General function	32
The neurone	33
Sensory nerves	35
Motor nerves	37
The spinal cord	37
The brain	40
The sympathetic system	46
Properties and functions of the neurones	47
IV. THE SIMPLE PROCESSES OF ADAPTATION: INSTINCT,	
IMPULSE, AND HABIT	53
Automatic acts	53
Reflex acts	54
Meaning of habit	56
The nature of instinct	57
Instinct and habit	61
Impulse and the formation of habit	63
Imitation, suggestion, and play	67

CHAPTER	PAGE
Uses and training of habit	71
Practical and educational applications of habit . . .	75
V. THE SIMPLE PROCESSES OF SENSE STIMULATION:	
SENSATION	85
Definition of sensation	86
Sensation and perception	87
Classification of sensations	89
Attributes of sensation	89
Sight sensations	90
Sound sensations	97
Taste sensations	99
Sensation intensity	104
Functions of sensation	106
VI. THE COMPLEX PROCESSES OF SENSE STIMULATION:	
PERCEPTION	109
Perception compared with sensation	110
Analysis of perception	111
Problems of perception	112
Conditions of perception	112
The thing and its properties	115
Space perception	116
Perception a mental reaction	126
The nature of illusions	127
The function of perception	130
Training in perception and observation	132
VII. THE SIMPLE AFFECTIVE PROCESSES: AFFECTION AND	
FEELING	141
Affection and its attributes	142
Sensation and affection	143
Definition of affection	144
Classification of feelings	146
Conditions of affective quality in feeling experiences	148
VIII. THE NATURE OF ATTENTION AND INTEREST . . .	156
Varieties of attention	159
Duration of attention	161

CONTENTS

vii

CHAPTER	PAGE
The range of attention	164
Attention as analysis and as synthesis	166
Relation of attention to interest	167
Interest and feeling	168
Educational applications	169
 IX. THE ASSOCIATION OF IDEAS	 177
Physiological conditions of association	179
Mental conditions of association	182
Secondary principles of association	187
Practical and educational applications	190
 X. THE IDEATIONAL PROCESSES: MEMORY	 195
Conditions of retention	198
Conditions of recall	199
Conditions and nature of recognition	200
The sense of time in memory and perception	203
The training of memory	207
 XI. THE IDEATIONAL PROCESSES: IMAGINATION	 211
Definition of imagination	212
The material of imagination	213
Function of imagination	214
Forms of imagination	217
The culture of the imagination	224
 XII. THE IDEATIONAL PROCESSES: CONCEPTION AND THOUGHT	 232
The nature of the concept	232
Origin and growth of concepts	236
Judgment and its relation to the concept	240
The reasoning process	243
Training and development of the thought processes	248
 XIII. THE COMPLEX AFFECTIVE PROCESSES: EMOTION AND SENTIMENT	 259
Factors in emotion	261
Expression of emotion	263

CHAPTER	PAGE
Nature and classification of sentiments	267
Emotion and sentiment educationally and practically considered	271
XIV. THE COMPLEX PROCESSES OF CONSCIOUS ADAPTATION:	
THE WILL	281
Ideomotor action	283
The place in volition of ideas or images	284
Volition in relation to attention	287
Desire and its relation to volition	288
Pleasure and pain in volition	289
Interest in volition	290
Relation of habit and association to volition	291
Will power in volition	292
Imitation and suggestion in volition	293
Making up the mind	296
Training of the will	297
INDEX	307

AN INTRODUCTORY PSYCHOLOGY

CHAPTER I

INTRODUCTION

Every science has an especial class of facts which it sets out to examine. The science of botany, for instance, takes for its subject matter plant life and development, and physiology, the life of the human body. The business of any science is to further and to make exact and systematic our ordinary knowledge about the facts of experience with which that science deals. Now, what is the set of facts with which psychology deals, and concerning which it seeks to make our knowledge more exact, more extensive, and more systematic?

The name itself, "psychology," may in part answer the question, for it comes from two Greek words meaning "systematic knowledge about the mind." The facts must then be mental facts, or facts of the mind's workings. Accordingly, we may provisionally define psychology as the science of the happenings of the mind.

The nature of mental facts. Let us notice some of these mental facts. I remember a day's outing, and my memory of it is very pleasant. This pleasant memory is a fact. I have it, and have it in my mind. It is a mental fact. I fear that some one is coming, whom I do not care to see. I picture him approaching, even though he may be a long distance off or perhaps not coming at all. You tell me I am imagining it. Well, so I am; but that unpleasant image is

actually in my mind, or is, in other words, a mental fact. The noise of the thunderclap, though having an outside cause, is in my mind, and so is the unpleasantness of the loud sound, and the hope that it is the last of the storm. The noise, the unpleasant feeling, and the hope are all mental facts. In fact, all our feelings and emotions, pains, hopes, and fears, all memories and imaginings, all one's thoughts and determinations, are mental facts, or facts of the workings of the mind, — in short, mental occurrences or processes.

Let us ask a little further something about the nature of these familiar facts. How do they compare with the facts of botany, or of physiology, or of chemistry? Plants and muscles and the metals occupy space and can be weighed and measured. We call them physical things. We cannot speak, however, of a surprise as occupying so much room, nor of a memory as weighing so many pounds, nor of a determination as being a foot square. It would seem absurd to speak of mental occurrences in this way. The mental facts do not seem to be like the physical ones, in that they do not occupy space and cannot be weighed and measured. This is their first characteristic, — a negative one.

Mental facts are, we feel, inside, personal affairs. They are one's own, one is intimately conscious of them. I feel my own pleasures and pains. I have my own memories and imaginations, my own hopes and resolves. Yours may be like mine; but yours are yours, and mine are mine. Each knows and feels, and is conscious of his own mental happenings. This, then, is its second characteristic, — each mental fact is a personally conscious affair.

But, though there is a great difference between mental facts and the facts of the material world, they seem to be connected in the closest ways. Let us notice how. For

example, notice a person when angry. When people are angry they usually show it — some more, some less — by their looks and actions, and can hardly help doing so. There is the mental fact, the feeling, and there are the physical facts, the looks and actions. If my mind is very active and I am paying close attention, I set my head firmly, shut my jaws tight, and perhaps scowl. I have in mind the thought of going out for a walk; I determine to do so: the walking, the physical occurrence, takes place. A bell is struck, the air waves vibrate, and I become aware of the sound; that is, I have a sensation of noise, a perception of the ringing of the bell. Now what do these instances show? They seem to show that each mental fact is very closely connected, one way or another, with a physical occurrence in one's body, or in something which can influence the body, or which the body can influence.

Of these facts of mind we can say, then, first, that they are unlike physical facts in that they do not occupy space and cannot be weighed and measured; second, each mental fact is a personally conscious affair; third, each mental fact is connected in a very intimate way with a physical occurrence.

It will be well to notice another way of distinguishing mental experiences — the facts with which psychology deals — from the facts with which the physical sciences deal. Of course both psychology and the physical sciences deal with facts which we experience, and we do not ordinarily distinguish between them. Our experience of the facts of our daily life is two-sided. There are the objects, physical objects, which we see, hear, taste, and handle. These physical objects and their ways of behavior are what interest us ordinarily in our daily experience of them, and are the facts with which the physical scientist — the

chemist, physicist, or botanist — deals. This is one aspect or side of the experience. The other side or aspect of the experience, the side which ordinarily calls for little interest and attention, is the way in which persons live these facts as their own inner experience. This aspect of the case may be suggested by the words which we commonly use in speaking of our own inner experience with these physical objects. We say we *see* them, we *hear* them, we *remember* them, we are *pleased* or *displeased* with them, we use them for our *purposes*, or to *satisfy* our *desires*. Now, the seeing, the hearing, the remembering, the being pleased or displeased, the purposes, and the satisfaction of desire, — these all are the other side, the inner, personal side of the experience. The boy who is building a snow fort does not take the trouble to sort out his experiences for the benefit of various scientists. The snow, the work, the success, the cold, the fun, the plans, his bodily movements, — all these are mingled for him in a direct, living way. But it does not take much reflection to distinguish the mathematical form of the fort from the boy's pride in his achievement, the snow from his feeling of cold, his bodily movements and exertion from his feeling of tiredness resulting, nor the threatening south wind from his hope that his snow fort will not melt down before it. Mathematics may treat of forms of forts, meteorology may treat of storms and temperature, physics, of forces engaged in the operations, physiology, of the blood coursing through his veins and the reasons for the boy's strength; but psychology treats of the fun of building the fort, the pride and the hope mentioned, the feeling of cold and of weariness and all the other personal aspects of the fort-building experience. All of our experience is, then, two-sided. It is our experience of the *things*, and it is *our* experience. The things and their

behavior, one side of our experience, are the facts with which the physical sciences deal. The inner, personal side of the very same experience consists of the mental facts, the facts with which psychology deals.

How mental facts are obtained. Let us next ask how we may obtain these mental facts in order to study them carefully. I think we may say that they are to be obtained by noticing what is going on in one's mind. When we have feelings, memories, etc., if we notice them carefully, we can surely have them before our thought for examination, just as we have plants and flowers before us for study. We can be aware of the inner, personal side of our experiences as truly, if not as easily, as we may be of the physical-object side. To pay attention to the happenings of our minds, to notice the mind's workings as they go on, — this is the way to obtain our facts. I can notice that one sound seems louder than another; that whenever a certain event is called to mind, it is attended by a painful feeling; that if I think of a certain house, I usually think of my friend who lives there. I can, by looking within, observe a great variety of mental occurrences, perceptions, memories, imagined pictures, emotions, sentiments, deliberations, determinations, pleasant and unpleasant feelings.

The chief difficulty which we have in looking these facts squarely in the face is that they are so close to us, and therefore we overlook them. We are unused to it. We look at the outer side of the experience rather than the inner, personal side. Practice, however, will very soon enable one to take the inward look and to notice the mental facts distinctly. There is, too, a wonderful help which we have in this matter, the *memory* of a mental occurrence. This brings it back to us, in a partially different setting, it is true, but it is again clear in consciousness, and we may complete our

first look. This careful noticing of what is going on in one's mind is called *introspection*. The etymology of the word shows its meaning. It is a looking within. This is by far the most important method of finding the facts of our science.

Another way to obtain mental facts is to notice what is going on in the minds of others. This is not as direct a method as the former, nor are its results as valuable. How can we tell what is going on in the minds of those about us? By their actions, looks, manner, and words. These we have to translate into the mental states which we believe they represent. In other words, we have to understand them by what we know of our own thoughts and feelings in connection with our own words and acts, and judge the mental workings of others accordingly. This method is called that of *observation*.

In addition to these two chief ways of obtaining the facts of the mental life, the psychologist carries the method of observation further in several ways, of which the following are the most important.

First, observation of the mental life of children. This really constitutes a separate field of psychology, usually called child psychology. It is of considerable assistance to the general psychologist because in this way we can notice many habits, ideas, beliefs, etc., as they are being developed. We can notice the conditions and factors involved in the growth, and thus learn their inner nature more thoroughly.

Second, we may notice the thoughts, feelings, and ideals of the people whose inner lives are portrayed in biography, fiction, and the drama. Here, too, we may notice the growth of various phases of their inner experience, the play of motives, and their issuance in conduct. These writings by

keen analysts of human nature are valuable descriptions of the workings of the inner or mental life.

Third, we may notice abnormal exhibitions of the mental life, such as cases of insanity, the dream life, and the interesting phenomena of hypnotism. These mental phenomena furnish facts for what may be regarded as a very special field of psychology; namely, psychology of the abnormal mind. Much light is thrown on the normal, regular working of the mind by a study of these irregular cases. The help derived from these sources by the psychologist is like that drawn by the physiologist from the pathological conditions of the bodily life, though it is not as great in extent nor of such importance.

Again, much has been done in recent years in the study of the behavior of animals, in order to understand the nature of their mental processes, and so we have a branch of psychology called animal psychology. All of these sources of help — child psychology, abnormal psychology, animal psychology, and descriptions and analyses of mental processes in literature — are but a further carrying out of the method of observation, the finding of additional facts of the mental life in an indirect way.

The mental scientist depends also, for the finding out of mental facts and the understanding of them, upon experimentation. This is a modern refinement of the methods of introspection and observation, supplementing them and making them more exact in their results. For example, in investigating the number of the degrees of brightness which one may see (white, black, and all the grays between), if language and ordinary observation were relied on, we should have black, dark gray, gray, light gray, and white, — five. Or we might realize that there are two or more blacks, for example that of velvet and of silk; two or more

whites, for example paint and writing paper; very dark and moderately dark grays, etc. Under experimental conditions, however, by means of black and white revolving disks carefully graduated as the experiment progresses, and by careful comparison, one may detect over six hundred qualities of black, gray, and white. In experimenting, the conditions under which the introspection and the observation are carried on may be carefully controlled and made exact, and the results are in so far the more valuable. Experimental psychology is not to be regarded as a separate branch of psychology. It is a method for obtaining more exact results in general psychology, and in the various special branches of the general science, such as child psychology, animal psychology, etc.

Of these methods we may repeat that the method of introspection, especially when carried on by the aid of the memory, is the first in importance. Its results would, however, be meager, were it not for the further help rendered by the observation methods. And, finally, advances of the most far-reaching character have been made in recent years by the employment of the experimental methods, making observation exact and introspection significant.

Problems of psychology. We have now considered something of the nature of the facts with which the psychologist deals, and have answered the question as to how these facts may be obtained for examination. Our next question naturally is the following: How does the psychologist deal with these facts in order to understand them more fully; what are his main aims; and indeed how, out of these facts, does he build up his science? Perhaps the first feature of work in psychology is to recognize the practical sorting of the material as found in our everyday speech and usage. We have such terms denoting mental states as memory,

emotion, reasoning, imagination, etc. Each of these aspects of mental life may be singled out and defined, and its own general characteristics noticed and described. To point out the more evident properties of a memory or an emotion, and to compare and contrast it with other mental states, would be our natural way of dealing with that particular state of mind as a result of our introspection. Our task is then, first, simply definition and description.

But this would hardly satisfy our desire for exact knowledge about these mental states. Our look must be a closer one. We carry further this work of scrutiny and seek for the parts out of which the concrete mental states are composed. This we usually call analysis, whether we are investigating a mental state, such as a fancy of the imagination, or a physical object, such as a flower or common salt. Of course such an analysis of a mental state or conscious process will be somewhat different from that of a physical object. It cannot be actually resolved into separate parts, or elements, so that each part may be experienced singly. And yet the most important purpose of the analytic process may be accomplished by directing the attention to the various features or components of the concrete state, and by reducing the complexity in an experimental way. Thus, one might analyze such a simple experience as the taste of lemonade: one can easily detect a sour taste, a sweet taste, a fragrance in smell, a certain temperature, and a sensation of cutaneous pricking in the mouth, — and all these in as simple an experience as what we call tasting lemonade. Nor have we included here the other parts of the whole mental state at the time one is tasting the lemonade, such as the pleasure, the memories aroused, and much else. When we have made our analysis as fine as we can, we may be said to have arrived at the elemental features of

the conscious process. And then, at the same time, we are also curious to know just how the parts fit together, or somehow combine to make up the whole concrete conscious process. We want to know how the parts are related to the whole, in what the synthesis consists. The perception of an apple, imagination of a shipwreck, an emotion of fear, — to determine how any one of these mental states is made up of different elements is a most interesting and indeed not difficult part of the psychologist's undertaking. Our second task is, then, one of analysis and synthesis.

Still our curiosity is not satisfied. In our study of happenings in the physical world about us, we want to know, for example, why the brook is so full of water to-day, rushing along like a torrent. And then we think of the heavy rains of yesterday and the day before. They are the cause of the high brook to-day. We are constantly asking what has happened before to make a certain thing behave as it is behaving. Just so we ask the question of our mental happenings. What has gone on just before to make them what they are? What is the reason for the unusually happy frame of mind which my friend is in to-day? I find out that he has been told of a holiday and a trip which his father has promised him. He has good reason for his happy thoughts and feelings. My friend suggests that I accompany him, and I determine to arrange my work so that I can do so. My determination is, in a measure, explained. The pleasant mood is easily accounted for. Just as we account for the swollen current of the brook do we account for these states of mind. Of course this is rough-and-ready finding of cause and effect in the physical world, and rough-and-ready psychologizing, but the general purpose is the same in more exact scientific work. The third task of the psychologist is, then, to find out the order of

succession of mental states, in so far as they lend themselves to such determination, and the conditions of consciousness which determine the nature of new conscious states.

Whenever I hear a sound or smell an odor, I am likely to look for its source. When I determine to sit down and write a letter to my friend, my body and fingers obey my will. As we have already seen, one of the chief features of our mental facts, or conscious processes, is that they are closely connected with some physical happening in our bodies, or in our environment as that affects our bodies or is affected by them. The human organism which has the experience of which we have been speaking not only has this experience in the double way of physical occurrences and mental processes, but is itself a mind-body affair. That the brain is the organ of the mind is now a commonplace. One of the most interesting phases of the science of psychology is to show the relation between our mental states and the physical things and events to which they refer, and also to show the intimate connection in the organism itself between the mental processes and the corresponding bodily processes. The fourth important feature of our problem, then, is to show the relation existing between our mental states and those physical occurrences in the body itself and in the external world connected with them.

We may say, then, that in examining its facts the task of psychology is fourfold. First, it attempts to mark off, define, and describe the general features of our mental processes; second, to analyze them in order to find out their elemental parts, and to make a synthesis of conscious elements so as to see how those parts fit in together and go to make up the whole concrete mental state; third, to show the order, in some cases at least, of their succession as they occur; and fourth, to show the relation between them and

the physical occurrences, in the body and in the external world, connected with them.

We have now seen something of the nature of mental facts, the kind of material with which the psychologist has to deal. We have indicated how these facts may be obtained. We have also outlined the nature of the problem which these facts suggest, the fourfold task of the psychologist. It may be well to add some considerations concerning the value of the study of psychology.

Practical applications of psychology. Without asking for a number of detailed values in the more practical sense, one can say that the study of psychology has the same intellectual value possessed by any other of the sciences into which the field of human inquiry is divided. At least it will tend to satisfy intellectual curiosity as concerned with its own set of facts. And if we learn in order to adjust ourselves the better to our total life, — physical, mental, moral, economic, social, æsthetic, spiritual, — certainly knowledge concerning the working of the normal processes of our own and others' minds is an essential feature.

More specifically it may be said that an intimate acquaintance, not mere book knowledge, with the ways in which mens' minds work is of decided practical advantage in business relations, in law (especially in connection with testimony of witnesses), in the practice of medicine, (the mental aspect of which is becoming so pronounced) in public speech, and in private intercourse. As an introduction to other sciences, too, as well as in connection with these arts just mentioned, psychology occupies a most important place. We may mention logic, dealing with the principles and procedure of correct reasoning; ethics, dealing with the principles of worthy conduct; æsthetics, dealing with the

principles of human appreciation of beauty ; sociology, dealing with human beings in society ; economics and politics.

Psychology and the teacher. In a most direct sense is the science of psychology related to the process of education and the art of the teacher. This relation we may examine in some of its more general aspects, and as we proceed with the various topics in this book some more detailed applications will be made. Psychology will thus be seen to be a very practical science.

The relation may be made plain by an example. The art of the electrical engineer depends in great measure upon a thorough knowledge of the science of physics, or that division of it called electricity. The art of the physician depends upon a thorough knowledge of physiology and of chemistry. These arts may be practiced in a "quack" way without such scientific knowledge, but for genuine thoroughgoing success it is essential. We realize, too, that the engineer and the physician must have good judgment in applying their scientific knowledge, or they will fail in their work.

The art of teaching, in like manner, depends upon the science of psychology. The teacher must know the mind of the pupil, its ways of working and of getting knowledge, in order to teach the pupil and help to mold his character in the most intelligent and thoroughgoing way. It is with these workings of the pupils' minds that the teacher has constantly to deal. They are the material that he must use. With this knowledge for his guide, he will have reasons for what he does, and will not go about his work blindly. Of course, the teacher must have practical sense and good judgment in applying this scientific knowledge about the mind and its behavior to his problems, or he will not succeed.

In one other feature we may compare the method of learning the teaching art with the art of the engineer and that of the physician. In the schools of engineering and of medicine a large part of the time is taken up with a study of the ways of applying the scientific principles to the main problems of the engineer and of the physician, and thus the learner profits by the knowledge and experience of the masters in these arts. It is the same way with learning the art of teaching. The teacher may become acquainted with the chief methods of applying the knowledge of the laws of the behavior of the mind to the various problems of the art of teaching. He, too, may profit by the knowledge and experience of others. Thus he may gain an insight into the principles of education and of management.

We find, then, that the art of teaching depends largely on a knowledge of the science of psychology, though this is not sufficient. The teacher must have practical sense and good judgment in applying this knowledge, and must become acquainted with the chief methods which study and experience have shown to be useful and well-founded in the practical work of teaching.

Although such knowledge of psychology and the methods of its application to teaching are essential for genuine success on the part of the teacher, it cannot take the place of two other important things with which the teacher should be thoroughly acquainted. The first is the subject which is to be taught. If one is to teach arithmetic, one must know arithmetic thoroughly; and so with any other subject,—botany, Latin, American history, etc. To try to teach any subject without this thorough knowledge is to invite failure from the start. And, of course, if any methods of instruction are particularly useful in the teaching of any one

subject, then the one who is to teach that subject should be thoroughly familiar with such methods.

The second important thing to be noticed here is that there should be a thorough acquaintance with the ends or purposes which education has in view. What kind of men and women do we want our pupils to become? What is to be the result of all this teaching business? What is the nature of the goal which is to be held in view? The answer to such questions as these must be deep set in the mind and heart of every true teacher. The end and purpose of the education process should be kept well in mind to guide the teacher truly in the practice of the art. These ends or ideals we must get from the ideals of the best people and from what the community expects of its best members. It is from the nature of our social life that these lessons must be drawn, and with this the teacher must be familiar. Our psychology will furnish us with the knowledge of the best means to be used for the attainment of these purposes, but what it is desirable that our pupils should become we must learn in another way.

We can thus see that among the essential features of the preparation of the teacher for his work an intimate knowledge of psychology, or how the mental processes operate, has an important place. Of course the teacher must have systematized and exact knowledge of the application of these principles to his work. He must have sense, sensitiveness, and good judgment, in the application of these principles to specific pieces of work and to individual cases. He must have a thorough knowledge of the subject to be taught and of special devices particularly useful in that subject. We have seen, too, that he must have a realization of the aim and purpose of the education process, and a deep conviction of its worth. But without a knowledge of

psychology the teacher would be handicapped to an even greater extent than would be the man of business, the public speaker, the lawyer, and the physician.

REFERENCES

ROYCE. Outlines of Psychology, Chapter I.

TITCHENER. An Outline of Psychology, Chapter I.

ANGELL. Psychology, Chapter I.

JAMES. Talks to Teachers, Chapter I.

MÜNSTERBERG. Psychology and the Teacher, Chapters XI and XII.

THORNDIKE. Elements of Psychology, Chapter XXI.

CHAPTER II

THE GENERAL NATURE OF CONSCIOUSNESS

What is consciousness? When wide-awake, I am conscious. When in a sound sleep, I am not conscious. When half asleep, I am just partly conscious. If one should faint, one would lose consciousness. When the first signs of coming to are apparent, one is gradually regaining consciousness. When fully recovered, one is fully conscious again. We are conscious, then, when we have any mental life or experience. So long as we have feelings and ideas, we have consciousness. To be unconscious means to be without feelings and ideas. Any mental happening is a conscious state of mind, or a state of consciousness. To say that we are conscious and to say that we have mental life — feelings, memories, etc. — is to speak of one and the same thing.

Definition. Our definition of consciousness may, then, be given in the words of Professor Baldwin: "Consciousness is the one condition and abiding characteristic of mental states."

Features of consciousness. In this chapter we shall attempt to set forth some of the more obvious, yet fundamental, features of the conscious processes as they go on. This seems the natural procedure in our study, for it will bring out the more general characteristics of the facts of the mind, and will in a way roughly outline the more special and detailed study which is to come.

Perhaps the first inquiry should be as to the general function of the conscious states, or the kind of part they play in the life of this psycho-physical organism called man.

The function of consciousness. As the various organs of the body have their various functions or offices to perform for the welfare of the human organism, questions like the following are sometimes asked: What is consciousness for, so far as the welfare of the whole life of the individual is concerned? What is the use and purpose of this highly developed series of conscious states? Why are our minds so much more complex, and of so much higher an order, than those of the animals, if indeed they have minds? Why are we endowed with conscious states at all, when there are so many living things which seem to have no consciousness? This question of the nature and purpose of consciousness has been, until recent years, neglected by the psychologist. The progress of the science of biology, and the general change in the way of looking at everything in the world brought about by the doctrines of biological evolution, have forced this question to the front and have made what is called the biological view of consciousness perhaps the most fundamental of all. What, then, is the function of consciousness; what is its meaning and use in the life of the organism? Consciousness, we are told, has been developed in the human species for some useful purpose, just as have the eye and the spinal column.

States of consciousness, or the mental processes, it may be said, exist in order that we may, by understanding ourselves and our environment, better adjust ourselves to that environment, and our environment to ourselves as far as possible. Each mental experience — sensation, perception, memory, judgment, emotion, and the rest — has its own office or function to perform in the way of being knowingly aware of what surrounds the individual, and of prompting the individual to act therein to advantage. Each sight, each memory, each plan we form, each emotional

stirring, has its own peculiar result in this life-and-death matter of adjustment to environment. How this goes on we shall in a measure see in the discussions which follow. The various aspects of consciousness exist in us for the purpose of our understanding ourselves and our environment, for our being stirred in such a way that we may respond to the needs of a situation, and for the purpose of our acting intelligently and forcibly under the circumstances in which we may be placed.

The first feature of consciousness in our account, then, may be stated as follows: Consciousness, as a whole and in its various parts, has as its office or function the furthering of the life of the organism by means of the superior adjustment which it is able to bring about. The importance of consciousness for this purpose becomes greater as we ascend in the scale of life, and as consciousness itself becomes more complex. We shall have occasion to notice at what especial point in the life and conduct of the organism conscious guidance becomes necessary. It should be kept constantly in mind that, no matter what the ranges of consciousness may be, it has thus a main function and business, and that, so far as we know, it owes its very existence to that organism whose fortunes it holds so within its grasp.

Consciousness in constant change. Let us notice, further, some of the features of this consciousness, or mental life, as it goes on. Take any busy hour and notice what is going on in the mind's experience. All through this hour, and all our waking hours, we are constantly noticing people and objects about us, now a few, now a great many. We are having memories which pass quickly out of mind, or which we fondly dwell upon. We are imagining all kinds of possibilities for ourselves, are having pleasant or

painful feelings, are perhaps stirred by an emotion. We are forming plans and are determining to carry them out. These mental happenings or states of consciousness succeed one another rapidly. While we may distinguish between these various conscious states, they are very closely connected, dovetailed into one another. These experiences, which each person has, have been well called a stream of consciousness. Consciousness flows on constantly during our waking hours. This is a very noticeable feature. Our ideas and feelings are constantly being succeeded by other ideas and feelings. The new day and the new year come. One feels now well, now ill. New plans succeed the old ones, and we have the pleasure of seeing them realized. Throughout each hour, each day, each month and year, there is constantly a changing procession of ideas, feelings, impulses, and other mental happenings. The second prominent feature of our mental life is this, — that consciousness is in constant flow and in rapid change.

Conscious states connected and personal. But this is only one side of the story. How intimately related these successive mental states are! One mental state depends on the one going before it, and in turn gives rise to the next. My thought about accomplishing a certain purpose is followed by my determination to act, and the act brings the pleasure of having accomplished the purpose and of having the desire satisfied. Our thoughts and feelings of to-day are very much like those of yesterday. We have very much the same tasks to perform, the same people to meet, the same places to be in, and toward them all we act and feel much the same one day as another. The same memories and the same plans linger long in one's mind. It is not all kaleidoscopic change. We are quite familiarly at home with our own mental states after all. They are our own. There is

the same personal reference, the same familiar feeling of self. Whether one has a plan or feeling or memory to-day or to-morrow, it is his own. The third noticeable feature of our consciousness is, then, that our states of mind are very closely related as they succeed one another; that there is a great similarity between them; and that there is the same personal reference, more or less definite, in them all, in a way binding them together.

Consciousness selective. Another noticeable feature of our consciousness is that conscious states differ considerably as to the amount of interest we have in them, and as to the amount of attention we give to them. My attention, when a story is being told, may be very slight and my interest meager. My attention is then likely to wander to other things in which I am interested. On the other hand, the story may be a good one, my interest in it may be very strong, and my attention absorbed by it. I give myself up to the story, and the state of mind is very different from the former one. In this latter state, where the attention and interest are given to the story, there will be some items or parts which are not as important as others, but which we notice somewhat. We may be somewhat conscious, too, of the presence of other people, or of the fact that the room is growing dark, or perhaps getting cold. We are conscious of these things but give them little attention. They have, at present, no interest for us. These almost unnoticed ideas have been called the fringe of consciousness. We seem to be very conscious of the interesting thing and that to which we give considerable attention. There seem to be degrees of consciousness. Or, to put it in another way, consciousness is more or less intense according to the attention and the interest. An idea or a feeling may be right in the focus of the light of consciousness, or

it may occupy any position away from the focus, until we have no interest in it whatever, pay not the slightest attention to it, and it leaves even the fringe of consciousness and disappears altogether. As the stream of consciousness flows on, it seems to flow in waves; ideas and feelings come and go, claiming various degrees of our attention and interest. We may repeat, then, as the fourth noticeable feature of our consciousness, that conscious states differ in the amount of interest they possess for us and in the degree of attention we give to them; and that in any state of consciousness we are more interested in some one part of the complex whole than in other parts, and give our attention to it at the expense of the rest. We shall find, as we proceed, that these activities of interest and attention are very important features of the mental life. A special chapter will be given to them, and their constant presence in varying degrees will be noted in connection with many of the concrete mental states which we shall have to examine.

Factors in consciousness. There is another noticeable feature, or group of features, very closely connected with the fourth feature, just referred to, which is easily observable in our conscious states as they go on. These features are familiarly referred to in our everyday speech, and are commonly understood as knowing, feeling, and willing. Consciousness behaves as a knowing thing; it also feels somehow or is affected pleasantly or unpleasantly, and is impulsive or active. This knowing feature is closely connected with the attention of the last section, while interest in anything means that the mind feels and is active in a striving, impulsive, or conative way. In speaking of the structure or make-up of our various states of consciousness we may say, if our common opinion is scientifically valid, that each state has in it, in certain proportions, these various

factors. Or, to put it in another way, consciousness acts all the while as a knowing, feeling, and impulsive affair, and in all these ways at once, now with greater stress on the knowing or having of ideas, and now with the feeling and impulsive feature predominating. At one time the state of consciousness is chiefly of the knowing sort, or is composed mainly of ideas, while pleasantness or unpleasantness and impulse may be very slightly in evidence. We may be so under the control of pain or joy that both knowing and impulse or action will be almost absent. Again, one's determination may be so strong that pain and pleasure are practically out of mind, and our knowing only important enough to give our determination some meaning. It often happens that the conscious state is one in which knowing, and pleasant or unpleasant feelings, both largely enter; or knowing and determination; or again, pleasantness or unpleasantness, along with strong determination, while in each case the third factor may be quite insignificant. Of so varied and complex a nature are our several mental states!

The mental elements. It is commonly said that the mind behaves in these three distinct ways, — the way of cognition or knowing, the way of feeling, and the way of willing. This means that our conscious states are made up of three factors, cognition (knowing), affection (feeling), and conation (willing). It is becoming more common, however, to regard these factors, or elements, as really but two, — either by regarding affection, or pleasantness and unpleasantness, and impulse, or conation, as simply two forms of feeling; or by regarding cognition and affection as the two elemental factors, with conation as really a compound made up of these two. The latter classification is probably more correct. We have, then, as factors in our states of consciousness, the

simple elements, cognition and affection, with a unique compound of these, which we may call conation. As we shall see later, the term "sensation" is preferable to "cognition" when used to describe the element of knowledge, but there is some advantage in using the more general term here.

Undoubtedly in one sense it is a very abstract or even far-fetched affair to speak of elements of consciousness at this stage of the discussion. There are, however, two considerations to justify it. The first is, that before any study of psychology we do speak constantly of knowing and feeling and willing, as though they were somehow different sorts of consciousness. The second consideration is, that, by recognizing these abstract elements at once, we are given a method of procedure, namely to inquire what part is played by each of these in our various mental states, thus affording at least one question about the concrete perceptions, emotions, etc., which will have a real meaning.

It is not often safe in scientific study to take the expressions and classifications of everyday life and adapt them to scientific usage. In this case, however, the practice is a help rather than a hindrance, for it recognizes that there are some fundamental differences in the material or structure of mental states, and sets the psychologist the task of looking carefully into their elemental nature.

Cognition. Let us examine somewhat more carefully the nature of these factors of consciousness. Cognition is a very important part of our conscious life. We perceive objects, learn their properties, notice their similarities and differences, classify them, and find out their cause-and-effect relations. We know people, we understand problems, we have in mind desirable ends, and we think out the means which will bring those ends to pass. In all these

experiences our conscious states are of the knowing sort, or are cognitive. We have various objects of knowledge before us, either as we directly see or hear them, or as they come up in memory, and we seek to know, to understand them. In behaving in this way of cognition or knowing, we may experience more or less of pleasantness or unpleasantness in the way of feeling. Or, again, in this process of knowing there may be more or less of active interest, striving, restlessness, in the pursuit of the knowledge or the attainment of the purpose. One may, however, be rather passively observant, or calmly contemplative, and, if so, the conative aspect of consciousness would be practically absent.

Feeling. Affection is a very intimate or personal phase of our conscious life. We are seldom, if ever, without it altogether. In a very joyful experience, or in a very painful one, affective feeling is extremely prominent. Pleasures and pains, emotions of joy and sorrow, are so well known to all that they need be simply mentioned. Of course there are all degrees of pleasant and unpleasant feelings, from the extreme, engulfing sort, to those which are hardly noticed. When we are experiencing considerable feeling of the pleasant or the unpleasant sort, the knowing aspect of consciousness may be present to a great or a small degree. So, in such cases, the conative aspect may be slight, as happens when we give ourselves up passively to the simple enjoyment of a pleasure; or it may be very intense, where our feelings spur or drive us on to action.

Conation. The conative aspect of conscious states is very prominent in all experiences of active interest and attention, of longing, desiring, determining, and willing. It is a well-marked condition, though probably composed, as was said above, of sensation and affection. In it we are conscious of restlessness, of action. In so far as the mind is

striving to realize a new condition, it is conative. Stout says: "Stated in its most general form, conation is unrest. It exists when and so far as a present state of consciousness tends by its intrinsic nature to develop into something else." In working out an interesting problem, one's state of mind is conative as well as cognitive. In the daring exploit spurred on by patriotic sentiment, the mind of the soldier shows its conative aspect in its determination, its heroic resolve, and its issue in bodily action. Consciousness of activity, of change, of progress, of restlessness of mind, may be taken as the mark of the conative aspect of mental states. With it there may be much or little of affection, much or little of cognition.

The fifth general feature of consciousness, then, is the following: Conscious states are made up of various elements or factors, that of cognition or those of a cognitive nature, and those of the affective or feeling sort, in varying degrees and combinations. To these is sometimes added the conative; but while many conscious states are, at least in part, conative, conation itself is rather a compound of sensation and affection, than a separate element.

In connection with this fifth general feature of consciousness, it may not be out of place to issue a warning. The mental elements, so called, do not exist as separate things, nor are the more concrete complex mental states formed by any aggregating of these elements. The latter are simply distinguishable features of actual states of mind. In the development of these mental states, both in the race and in the individual consciousness, it should be realized that these so-called elements are the result of differentiation and distinctions possible only in the higher ranges of the developing process, while the mental states themselves become in this process more unified and less capable of any actual division.

The five general features of our conscious processes are then the following: First, consciousness as a whole and in its various parts has as its function the furtherance of the life of the organism by means of the superior adjustment to life's conditions which it is able to bring about. Second, consciousness is in constant flow and rapid change. Third, states of mind are very closely related as they succeed one another; there is a great similarity between them; and they have, more or less, the same personal reference. Fourth, conscious states differ greatly in their degree of interest and attention. Fifth, consciousness is, in the way described, composed of mental elements.

While these five features of consciousness have thus been outlined as very obvious and yet fundamental and important for the student to take account of, certain others might be added; and, indeed, these might have been subdivided, while some writers might not think it best to include them all. It is hoped, however, that what has been said will prove profitable, in an introductory way, and it is the thought of the writer that further refinement and additions at this stage would not be especially profitable.

Mental development. In seeking to give an account of the nature of the mental processes, or happenings of the mind, it must be remembered that the earliest experiences of the child are quite different from those which come some years later. After the earliest childhood is left behind, there is in the stream of consciousness all that variety of concrete mental experiences which we call thinking, — conceptions, memories, imaginings, perceptions, feelings, emotions, and volitions. These become quite distinct from one another, and we can describe them by their own characteristics. During the first experiences of childhood, however, the mental life is of a much more

confused, vague, undifferentiated sort. Probably this confused, vague stream of consciousness has in it in embryo practically all of the later developments, but decidedly in embryo. The child is not aware in a conscious way of the sort of mental life that it is experiencing. It does not as yet distinguish between itself and others; it does not distinguish objects clearly as objects, nor does it distinguish its own self and its inner conscious life from the world of objects in which it lives. In this very impersonal way, vague and confused, it no doubt has certain pressure and temperature sense-perception experiences, tastes, sounds, sight impressions, pleasures and pains, instinctive and impulsive tendencies, memories or images, and even the beginnings of conception and reason. But it can hardly be said that they are definitely distinguishable as yet; and certainly it would be most incorrect to think of the mental elements actually existing in isolated refinement in the mind of the babe, waiting to be amalgamated into various compounds as the results of experience.

Method. In our study of the mental processes in a scientific way, we might begin with the earliest experiences of the child, such as those mentioned above, which may be picked out from this confused stream of consciousness, and trace the development, stage by stage, to the more nearly adult consciousness. This branch of psychology, or method of studying mental processes, is referred to as genetic child psychology. By the various ways of observation and experiment the development of the normal life of the child may be traced stage by stage. Much work has been done along this line and many valuable results have been reached.

Or we might take up the chief forms of concrete mental experience of the more developed adult life, and study them in accordance with the problems of the fourfold task of the

psychologist mentioned in the first chapter. Each plan has its advantages, but the latter is to be the general method of this book, advantage being taken, however, of the genetic method wherever it seems to be of especial value.

It will probably be most useful to discuss first those more elemental parts of the mental life, such as simple sensations and sense-perceptions of objects clearly analyzable into these more elemental sensations, simple experiences of pleasantness and unpleasantness, and the early life of impulse and instinct and the formation of habits. Then, after examining more carefully the nature of these general characteristics of mind, attention and interest, referred to above, the examination may be profitably made as to how these enter into the more complex mental operations such as memory, imagination, reasoning, emotion, and volition.

As was said above, while advantage will be taken of the method of tracing the development from earlier to later stages of mental life, yet the main task of the book will be to tell the story of the concrete mental states or conscious processes as the normal mind, beyond the earliest formative stages, experiences them.

If we can accurately understand the nature of the conscious life as it goes on, the way it develops, the laws of its behavior, the normal growth of knowledge, the conditions of the natural progress of the individual in the ways of emotion, interest, the forming and fulfilling of motives, of ideals, and of determinations, psychological knowledge can play that practical part in life which it would seem natural to expect of it. In any business or act in which one is engaged in connection with his fellow men, his acts should be more intelligent and effective for this knowledge of the natural behavior of the mind. The teacher, among others, should be able to act the more wisely in

the way of helping the development of the mental process of those under his guidance, so that the pupils may achieve the most and become the most efficient in all the best ways of knowledge, attitude, and conduct.

Before proceeding with the further discussion of the nature of conscious states, however, it will be necessary to call to mind some of the facts which the science of physiology furnishes. We must examine to a certain extent that upon which all conscious life depends, namely our bodies, and more especially the nervous system and the sense organs. The organism is a unit. It must not be thought of as mind plus body, or mental processes plus physical processes, in any externally related way. The organism called man is a mind-body affair, a unitary psycho-physical organism. This close, inseparable connection of the mental with the physical life has already been dwelt upon. Conscious processes live and have their being as part and parcel of the whole organism. The connection between the simpler forms of conscious life, sensation, pleasantness and unpleasantness, and even perception and memory, on the one hand, and the bodily organs and the nervous system on the other, seems very close indeed. In habit and instinct, too, it is difficult to separate these two aspects, mental and physical, and this very difficulty points to the unity of the two and is a warning against a possible violent separation.

It is not so obvious, perhaps, but none the less true, that the higher and more complex forms of conscious life, such as the association of ideas, reasoning, emotion, deliberation, and decision, are just as closely related to the nervous system and just as much an integral part of the whole organism as are the simpler forms mentioned above.

In order that the whole matter may be better understood, it is now desirable to proceed with a brief account of the structure and functions of the nervous system.

REFERENCES

- JAMES. Psychology, Briefer Course, Chapter XI.
 ROYCE. Outlines of Psychology, Chapter IV.
 DEWEY. Psychology, Chapter II.
 JUDD. Psychology, Chapter IV.
 THORNDIKE. Elements of Psychology, Chapters VII and VIII.
 SULLY. The Human Mind, Chapter IV.
 MILLER. The Psychology of Thinking, Chapters I and II.

CHAPTER III

THE NERVOUS SYSTEM

General function. By means of the nervous system we are stimulated or affected by our environment ; we are made aware of that environment and of its relation to us ; and under its guidance and by its help we are enabled to act upon that environment in various ways more or less useful to ourselves.

The lowest forms of animal life are not endowed with nervous systems, and their movements and life functions are very simple. They are irritable, indeed : that is, they are susceptible to some forms of stimulation, and they do, of course, make certain necessary movements in response to these stimulations from their environment ; but these responses are crude and are certainly not ready and resourceful ; the organisms concerned are in no way masters of their environments, but have their lives determined by what their environment supplies them with. The difference between the life of one of these lowest animal forms and that of the higher animals, and even of man, is largely in the possession by the latter of a highly developed nervous organism, and in the complete lack of it by the former.

As we ascend in the scale of life we find the nerve cells gradually being developed and becoming more and more a well-marked-off part of the organism. As they grow more complex, they become more and more effective, and the resulting movements more varied and resourceful. The higher the animal in the scale of life and the more developed and complex the nervous system becomes, the more is he master of his movements and his fate.

In man we find the most highly developed nervous system, and along with it, of course, the greatest capacity for response to his environment, both in the ways of being affected by it and in the myriad ways of effective and advantageous response. Man, too, marks the highest level in the series in the size and quality of that most important part of the nervous system, — the brain. The higher up in the scale of animal development the organism is, the greater the size and weight of the brain in proportion to the size and weight of the body. Undoubtedly, too, the quality and amount of consciousness has a similar progress. Man's highly developed nervous system and large and complicated brain mean that his life and conduct are consciously directed in the most complete sense. The intimate connection between the nervous system in man and his various states of consciousness has been spoken of in Chapter II, and perhaps calls for no further comment here. It is a matter of common knowledge and needs at this time no especial evidence to be cited as proof.

The neurone. The nervous system is, of course, a part of the whole bodily organism and acts in conjunction with it. In order to understand its nature it should be thought of in terms of its composition or parts. It is composed of cell units called neurones, varying in length from a small fraction of an inch to over a yard. These neurones are composed of two parts, the nerve cell proper, or cell body, and their fibrous elongations called nerve fibers. These fibers, in turn, are of two sorts. Each cell body has one well-marked fiber which is called the axone, or axis-cylinder process, which has few branches and these rather regular and going out at right angles from the main axone. The other fibers connected with the cell body are called dendrites, are likely to be many in number, and branch out in

a very bushy, tree-top-like way. The cell body with its axone and its dendrites make up the true nerve cell or neurone. The nervous system is, then, simply a great aggregation of these neurones, about eleven billions having been given as an estimate of their number. When the nervous system is thought of in this way rather than as a

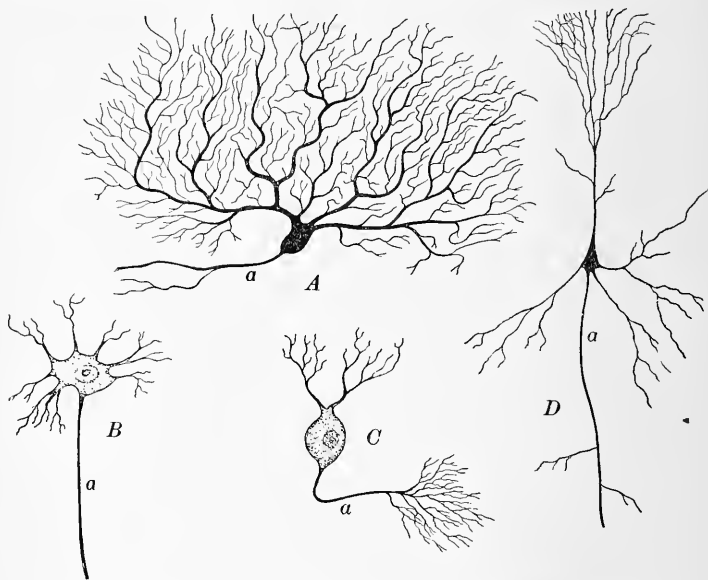


FIG. 1. A group of neurones.

A and *C*, from the cerebellum; *B*, from the gray matter of the spinal cord; *D*, from the cerebrum; *a*, the axone; remainder, cell body and dendrites

pulpy, stringy mass, it is much easier to understand its structure and its ways of working.

Gross parts of the nervous system. Perhaps a more common way of regarding the nervous system is to think of its gross structures. In so doing it must not be forgotten that each of these parts is composed of the nerve cells or neurones.

Looked at in this way of gross structures, the nervous system is composed of the brain, consisting of several parts as we shall see later, and the spinal cord, — these two constituting the central nervous system; the sympathetic system; and the so-called nerves connecting the brain and the spinal cord with the sense organs and the muscles.

In describing the nature and general structure of the nervous system, it may be well to follow the order suggested by the general well-known functions of the different parts. It will be of help to keep in mind the fact that the whole nervous system is just a superb piece of mechanism for the receiving of stimuli from the outer world, for the transferring and dispatching of these nervous impulses, and for converting them into motor responses of such a sort that the whole organism may receive the benefit of its high-grade nervous constitution, in the way of better adapting it to the conditions of its life and of making such changes in those conditions that it may have a fuller and richer life.

Sensory nerves. To begin, then, with the nervous filaments which receive stimulations. These nerves are distributed to all the sensitive parts of the body and, indeed, make that sensitiveness possible. They consist of fine whitish threads or filaments which end in various spreading branchlike ways in the various sense organs, the skin, the retina of the eye, the tongue, etc. These are the fibrous elongations of the neurones spoken of above. "A frayed-out bit of string" they have been likened to. Following along from the sense organs inward, we find these fibers uniting into bundles, eventually forming a nerve cable or trunk. These nerve trunks, with the exception of those in the head, make their way to the spinal cord. The nerve trunks which carry the stimulations from the sense organs situated in the head, — the eyes, ears, tongue, etc., —

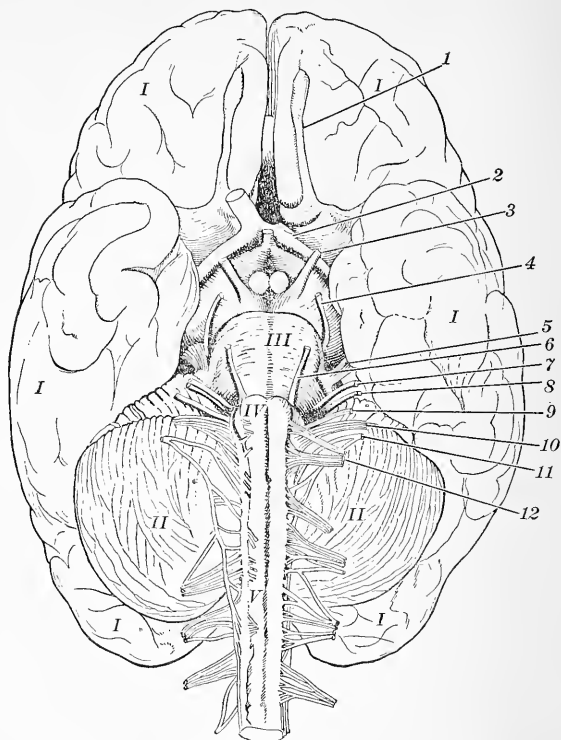


FIG. 2. The brain from below (the base of the brain). Gross structures and cranial nerves are shown

I, cerebrum; II, cerebellum; III, pons Varolii; IV, medulla, or bulb; V, spinal cord; 1, olfactory nerve, the nerve of smell; 2, optic nerve, the nerve of sight; 3, 4, 6, nerves supplying the muscles of the eyeball; 5, sensory nerve of face (mainly); 7, motor nerve of face; 8, auditory nerve, the nerve of hearing (mainly); 9, sensory part is nerve of taste, motor part connected with pharynx; 10, 11, nerves with various sensory and motor functions; 12, motor nerve to tongue muscles

find their way directly to the brain and are called cranial nerves. These fibrous filaments used for conveying stimulations to the brain and spinal cord are called sensory or

afferent nerves, or nerve courses. They are also called peripheral nerves or neurones, although on this functional classification of neurones the name would apply as well to the motor nerve courses of which we shall now speak. The name peripheral is used to indicate the fact that they run to the periphery or outer regions of the body, while the neurones composing the brain and spinal cord are referred to as the central nervous system.

Motor nerves. The nerve filaments or courses which convey the nervous impulses from the nerve centers out to the voluntary muscles we may call the motor nervous apparatus. They are also called efferent nerves. In general appearance, size, color, and the forming into bundles or trunks they are like the sensory nerves. They may be traced from the brain to the muscles of the head, and also from the spinal cord to the various muscles all over the trunk and limbs. They are to be found, like the sensory nerves, leaving the cord in bundles at regular intervals along its length. There are thirty-one pairs of these nerves, sensory and motor, passing out from the spinal cord. There are twelve of the cranial nerves, some sensory, for example the olfactory nerve, or nerve of smell, the optic nerve, or nerve of sight; some motor, for example the facial nerve, governing the muscles of the face, and others which contain both sensory and motor filaments. For cranial nerves see Fig. 2.

The spinal cord. One peculiarity of the sensory nerve trunks is that on each one of them just before entering the cord is an enlargement composed of the cell bodies of the nerve fibers making up that particular nerve trunk. These are called sensory ganglia, and are mentioned here because, although outside the cord itself, they are most easily thought of as practically a part of it. These ganglia are not found

on the motor trunks, as the cell bodies of the motor nerves are found within the cord itself.

The spinal cord extends along the vertebral column, in the spinal canal, from the medulla at the base of the brain as far as the last lumbar vertebra, its average length being about a foot and a half. A cross section shows the general interior arrangement of the neurones making up the cord. It is nearly circular in appearance, with deep indentations front and back. The outer portions of the cord are great bundles of fibers running in the main up and down the cord. The back part of the outer portions of the cord is composed of fibers along which currents pass up to the brain, the afferent or sensory fibers. These find their way to the medulla, or bulb, — which is practically an enlargement of the cord at the base of the brain, — and, crossing over here, finally come to that side of the brain, right or left, opposite the side of the body from which originated the stimuli that they carry. The front part of the outer portion of the cord is likewise composed of fibrous filaments, and along these pass the currents from the brain, to be taken in turn by the motor courses as they leave the cord to connect with the muscles. These bundles of fibers forming the outer portion of the cord are the so-called white matter of the cord.

The interior portion of the cord is grayish in appearance and is mainly composed of the cell bodies of countless neurones. They are microscopically small. They occupy less than half the area of the cross section of the cord, and are arranged in the way illustrated by the shaded portion, or *H*, of the diagram. See Fig. 3.

Tracing the sensory neurones from the spinal ganglia, we find them entering the cord, but, not to any great extent going into the gray matter of the cord. They usually

branch, going downward and upward, along the white matter in the back part of the cord. Some of them sooner or later find their way into the gray matter of the cord, but many find their way directly to the brain, as has been indicated above. Many of the neurones of the cord are connecting tracts or intermediaries between the sensory and motor courses. The axones of the cells in the horns of the cord in front go directly out to the muscle fibers they control.

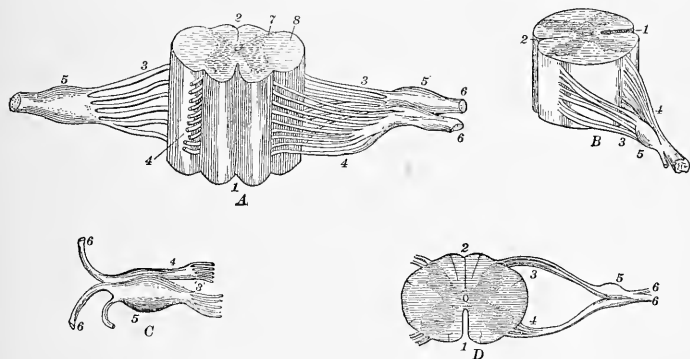


FIG. 3. The spinal cord with roots of nerve trunks

A, segment of cord from ventral side (front); *B*, segment of cord laterally; *C*, the two roots of a spinal nerve; *D*, cross section of cord; 1, ventral fissure; 2, dorsal fissure; 3, dorsal or sensory roots; 4, ventral or motor roots; 5, ganglion on dorsal root; 6, nerve trunks; 7, gray matter; 8, white matter

We have indicated that the fibrous whitish courses have as their function the carrying of nervous impulses to and from the brain. The main function of the cell bodies forming the gray matter of the cord is to receive and send out again the various nervous currents. Certain reflex acts are controlled by these cell bodies. That is, some of the sensory currents are received by these cell bodies, and are immediately transferred to those motor courses which also have a functional connection with them. This is done without

“leave or license” on the part of the brain. The knee jerk is an example of a reflex act thus provided for. The chief office of the cell bodies, however, seems to be that of serving as a kind of halfway house for the sensory currents on their way to the brain, and for the motor currents on their way from the brain to the muscles. While the receiving and dispatching of the nervous currents seems to be the chief business of the cell bodies of the neurones in the cord, those cell bodies — or it may be the few fibers mingled with them — act in part as carriers of nervous currents.

In the cord, as elsewhere in the nervous system, when the nervous impulse is transferred from one neurone to another we must not think that the neurones are really united. They are anatomically distinct, as the physiologists say. But all the same the current passes from the tiny, fibril-like endings of the axones to the fine “feelers” or bushy branchings of the dendrites, picked up as it were by the latter. This place of transfer is called a synapsis, or clasping. Another point to notice is that between the various parts of the body the nervous connections are not very direct, but constitute what has been called a system of relays.

The brain. Next in order in our brief sketch of the structure and functions of the nervous system is its most important part, — the brain. It consists of countless numbers of neurones, so arranged that the mass of white fibrous tissue is on the inside, while the covering or rind consists of the mass of grayish cell bodies fitting into all the folds and fissures of the brain. The parts of the brain other than the cerebral hemispheres, namely the medulla, the pons Varolii, the cerebellum or little brain, and others, need not be taken much into the account. As we have said, the medulla is really an enlargement of the cord at the base of the brain.

The fibers from the spinal cord pass through the medulla on the way to the higher ranges of the brain. The cell bodies of the medulla control a number of reflex acts. There is a considerable crossing over of the fibers in the medulla as mentioned above, on the part of both sensory and motor tracts. The medulla is only about an inch and a

quarter long and is shaped somewhat like an inverted truncated cone, with deep fissures along its sides. Next above the medulla is the pons, a bridge of fibers, as it were, between the medulla and the higher regions of the brain. Many of the cranial nerves come out of the medulla and the pons.

Back of the pons is the cerebellum.

Its connections

with the brain and spinal cord are also through the pons. The function of the cerebellum is not well known, although it has been shown that it has much to do with making our actions smooth and accurate rather than rough and awkward.

For the student of the mind the large cerebral hemispheres filling almost the whole of the skull cavity are the

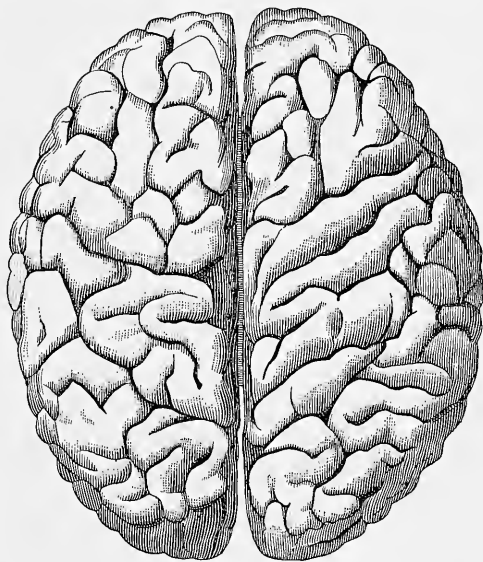


FIG. 4. The human brain viewed from above. The cerebral hemispheres completely cover the rest of the brain

important part of the brain. The cerebrum consists of the two large hemispheres, right and left, which are connected by white fibrous tissues called the corpus callosum. The hemispheres are divided into lobes, the frontal lobes in the front part of the skull cavity, the temporal lobes above the ears, the parietal lobes about the crown of the head,

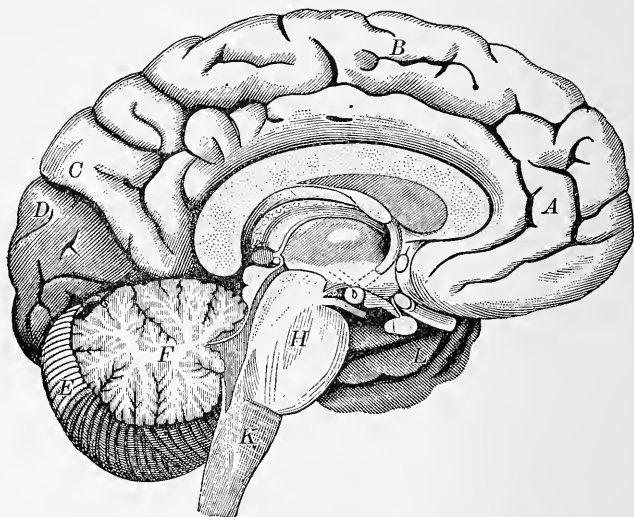


FIG. 5. Median longitudinal section of the human brain

A, B, C, D, L, convolutions of the median surface of the cerebrum; *E, F*, the cerebellum, showing in the plane of section the inner white matter and the outer gray matter; *H*, the pons Varolii; *K*, the medulla

and the occipital lobes at the back part where the skull begins to curve in toward the neck. The position of the great fissures or deep canals of the surface of the brain can best be learned from the diagram. It will be seen that the fissure of Sylvius separates the temporal lobe from the frontal and the parietal, while the fissure of Rolando is between these two latter. See Fig. 7.

The cerebrum. The cerebrum is a most complex and delicate organ. Its cortex is the great receiver of stimulations from the sensory tracts, the great dispatcher of currents along the motor courses, while, even more important, its neurones are the great connecting factors between the sensory and the motor courses. The larger part of the cerebral hemispheres is composed of these connecting neurones or tracts. There are hundreds of millions of these brain neurones, and each cell body is richly supplied with the fine fibril, branch-like endings, the frayings of the strings.

Notwithstanding their great number there is a great perfection of arrangement among these brain cells, and system in their behavior. There is a division of labor among the various parts of the cerebral rind or cortex, it having been

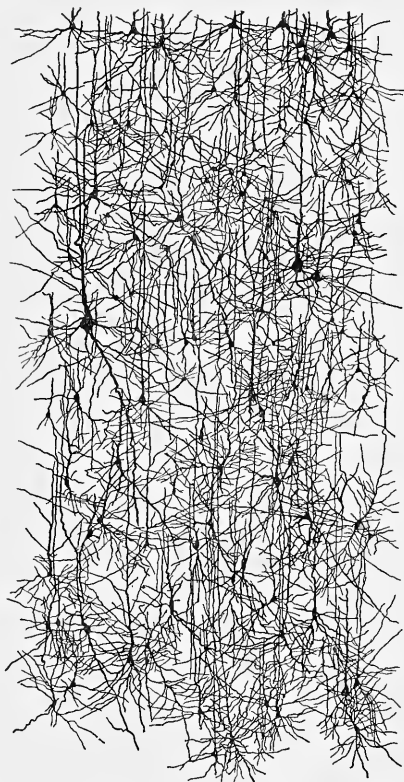


FIG. 6. A portion of the gray matter (cortex) of the cerebrum (highly magnified).
After Kölliker

Note the large number of dendrites. The axones are the fibers of uniform diameter running lengthwise of the drawing. One of these cells is shown in Fig. 1, *D*

shown by physiologists that there are certain parts especially and directly concerned with receiving sight stimulations, other parts with receiving the various other sensory currents, while there is a motor zone fairly well marked off whose different parts control movements in the head, the arms, the trunk, and the legs respectively. Many parts

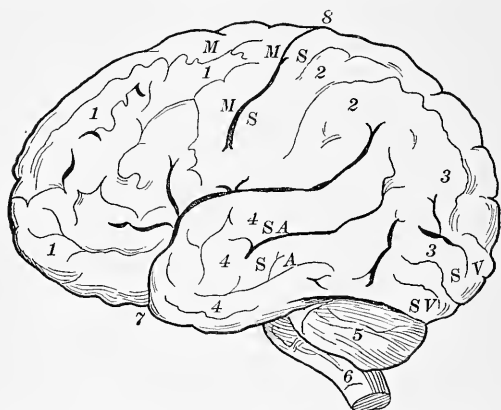


FIG. 7. Left side of brain, outer surface, showing lobes, fissures, and chief sensory and motor areas

1, frontal lobe; 2, parietal lobe; 3, occipital lobe; 4, temporal lobe; 5, cerebellum; 6, medulla; 7, fissure of Sylvius; 8, fissure of Rolando; *M*, motor areas; *S*, sensory areas; *SA*, sensory auditory area; *SV*, sensory visual area

of the cortex, however, are concerned with our perceptions, memories, etc., besides these receiving places for sense stimulations; many with our thought about our conduct, besides the motor centers immediately concerned; while the connecting neurones are in number and

complexity past computation. The whole brain is more or less concerned in the activity of any part, and the mutual influences between the various parts are very subtle.

The motor region, that is the cortical cells controlling movements, seems to be situated along the front side of the fissure of Rolando. The sensory region is to be found in parts of all the other lobes except the frontal. The occipital lobe is especially concerned in sight, the temporal lobe in

hearing. The frontal lobes seem to be the especial regions of intellectual activity of the higher sort, while the frontal and the parietal lobes contain what are called the association areas. The cortex of the cerebrum, while only about one eighth of an inch, or less, in thickness, covers a much greater area than the size of the skull would indicate, on account of its dipping into the folds and fissures of the brain tissue. The inside part of the brain, the white matter, the so-called associating or connecting tracts or fibers, form, as was said above, the main bulk of the hemispheres. They connect the two hemispheres, connect the lower parts of the brain with the sensory and the motor areas on the cortex, connect neighbors on the cortex, sensory, and motor, connect each and all of these with the various higher centers in the frontal lobes and elsewhere. See Figs. 8 and 9.

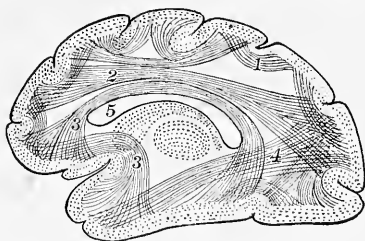


FIG. 8. Fibers connecting different parts of cerebral cortex with one another

1, fibers between near-by regions; 2, fibers between frontal and occipital regions; 3, fibers between frontal and temporal regions; 4, fibers between occipital and temporal regions; 5, corpus callosum, the fibrous tracts connecting the hemispheres



FIG. 9. Fibers connecting the cerebral cortex with lower brain

1, fibers from frontal region to pons; 2, motor fibers; 3, sensory fibers, touch; 4, sensory fibers, sight; 5, sensory fibers, hearing

The sympathetic system. The nervous system is composed, as stated above, of the brain, the spinal cord, and the peripheral neurones of the sensory and motor sort, and in addition to these, the sympathetic nervous system, about which a few words ought to be said here. It is, of course, composed of nerve cells or neurones like all nerve tissue. It is located, in part, near the spinal cord, running up and down in two groups of strings, one on each side of the cord. Then there are sets of ganglia in various parts of the trunk, more or less connected together, more or less isolated. These neurones composing the sympathetic system seem to act somewhat in conjunction with the brain and spinal cord, and in part independently. They are the nervous basis of the so-called automatic activities of the important life functions of breathing, digestion, the circulation of the blood, etc.

For the purposes of psychology the activities of the cortex of the cerebrum, that is of the neurones composing it, are all important. On these activities consciousness depends. Any activity in the organs of sense, or in any of the cells lower than the cortex of the cerebrum, is felt in consciousness only as it leads to activity in the cortical neurones themselves. There may be some portions of this cortex itself which are not so honored, and certainly there are stimulations of its neurones which are too mild to be reported in our conscious life. It is quite possible that in our dream life and in certain diseased conditions some activities of the neurones below the cortex may be reported in consciousness, and that in our ordinary life such activities may have an obscure influence upon our general mental tone; but in general it may be said that every conscious state is based upon activities in the cerebral cortex.

Properties and functions of the neurones. After this brief description of the structure and functions of the nervous apparatus it may be well to point out more particularly certain qualities or characteristics of the neurones as they perform their tasks.

First, they are irritable, or sensitive to impressions. They receive stimulations from sense organs and from other neurones. This quality of *sensitiveness*, possessed by all organic cells, belongs in an extreme way to the neurones. It is the first condition of their doing their work.

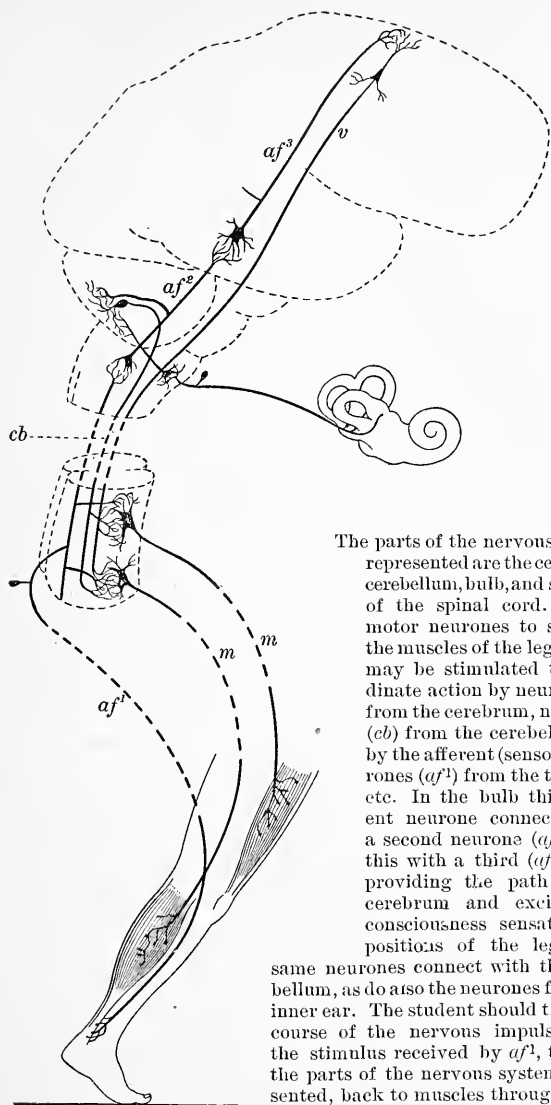
Second, the neurones are good carriers of this energy by which they are stimulated and to which they are so sensitive. This property is called *neurility*, or *conductivity*, that is, the neurones are conductors of nervous force, or nervous currents, or, in other words, possess the transmitting function. These currents, whose nature is not at all well known, but which have been roughly compared to currents of electricity, have a rate of over one hundred feet a second. The current is discharged so that some other neurone is affected or stimulated, and the current, or nervous impulse, is carried along by it; or, the cells of a muscle respond in their own way to the stimulation received from the neurones with which they are connected. The neurones carry the nervous currents from the sense organs to the brain, from one part of the brain to another, and from the brain to the various muscles of the body. It was formerly thought that each neurone could transmit only its own particular sort of nervous impulse, and that it could not receive or transmit any other sort. This has been shown, however, not to be the case. Each nerve course carries its own peculiar form of nervous impulse on account of its connections, that is the nature of the end organ, etc. Of course, each neurone becomes more and more susceptible to its accustomed stimulations,

the nerves of the special senses acquiring distinct habitual tendencies to perform their own sort of work. Both the sensitiveness and the neurility or conductivity of the nerve courses are to be thought of in an impartial way with respect to the form of nervous impulse, except in so far as their work is determined and the nature of the neurones themselves modified by their specific connections.

The third property, or set of properties, might be called the *reacting* function. By reacting is meant the receiving of a nervous impulse from a sensory course and a switching of the current so that it is carried out along a motor course. As this is exhibited in a very simple way by those neurones lower than the cerebral cortex, and in a much more complex way by the cortical cells themselves, the two must be described separately.

The simpler subcortical reactions, excluding the activities of the sympathetic system, are presided over by the cell bodies in the lower brain and in the spinal cord. They depend upon some definite stimulation of a sensory course and have definite ways of motor response. They are thus of the reflex type, and are only reported in consciousness if for some reason the connected cortical centers happen to be stimulated.

Brain-cell properties. Certain characteristics of the behavior of the brain cells may be noticed. Their great work seems to be that of receiving the nervous impulse from the sensory nerves and of dispatching currents along the motor courses. This does not happen, however, in a mechanical, reflex way. The sensory impulses are not only received, but they are associated with other brain areas in such a way that when the motor current is sent out, or, it may be, withheld, the action or refraining from action is much more effectively adapted to the exact conditions of life than



The parts of the nervous system represented are the cerebrum, cerebellum, bulb, and segment of the spinal cord. m, m , motor neurones to some of the muscles of the leg. These may be stimulated to coördinate action by neurones (v) from the cerebrum, neurones (cb) from the cerebellum, or by the afferent (sensory) neurones (af^1) from the tendons, etc. In the bulb this afferent neurone connects with a second neurone (af^2), and this with a third (af^3), thus providing the path to the cerebrum and exciting in consciousness sensations of positions of the leg. The

same neurones connect with the cerebellum, as do also the neurones from the inner ear. The student should trace the course of the nervous impulse from the stimulus received by af^1 , through the parts of the nervous system represented, back to muscles through m, m .

FIG. 10. Diagram of the nervous mechanism of walking

simple reflexes could possibly be. The brain cells thus form the register and clearing house of the system, and have the responsibility of directing the movements of the organism for weal or woe. On the mental side this is consciousness, perception, thought, feeling, deliberation, decision. In performing these general offices the brain cells show the property of coöperation for the purpose of control, or what might be called *harmonization*. While each part of the brain has its especial function, that function is performed as a detailed piece of work of a well-organized, and a harmoniously working, complex affair.

The other main property which these brain cells show is that of *plasticity*, or modifiability, — the capacity for learning, for profiting by experience, and for acquiring new reactions. This property shows itself in two main ways. First, by repeated receiving, registering, and dispatching of the nervous currents or impulses, the groups of brain cells become so arranged, organized, or integrated, that a habit is formed of such and such ways of behavior, on account of the retention by the brain cells of the modification of structure and capacity for behavior. The first feature of plasticity which the cells exhibit, then, is that of *habit*. The plastic elements become more and more fixed in their structural arrangement and their ways of action. There is a stable organization, a fixed way of response, a uniformity of behavior under similar conditions of life and stimulation from environment. This is the case in the so-called habitual nervous actions, such as manner of walking, of lacing up one's shoes, or any of the thousand and one common routine acts of life.

But there is another feature of the case, another way that the plastic cells develop. This other feature is that of reform and *accommodation*. Certain groups of cells remain,

directly or indirectly, very sensitive to many kinds of stimulations. And as the stimuli are not uniform, neither are the responses. There is a less fixed or stable arrangement of the cells, and there is less certainty in the matter of response. These arrangements of structure and ways of behavior are called "higher" than the habitual ones. They make possible control of movement and voluntary action. They also make possible the breaking up and reform of habits. The shifting of the tensions of the nervous impulse in the case are many and complex. The higher groups of cells are especially active and contribute to the solution of the problem of the best possible reaction in the case. The reaction is in no sense ready-made, as in the case of habit. It is figured out to suit the emergency, and much thought and feeling are involved as the mental side of the affair.

In connection with this property of accommodation, and completing it, is the property of *inhibition* on the part of the higher brain cells. These higher groups of cells have the power of arresting or holding up the nervous response for a shorter or longer time, in order that, after due deliberation, the individual may act advantageously and as he determines. It is essential to the welfare of the organism that it should know when not to act, and have the power to prevent too sudden and thoughtless a response. There is to a certain extent such a connection between the higher cells, and the lower ones which are given over to habitual reactions, that when occasion calls for it the habitual tendencies may be in great measure controlled by the higher, accommodating, inhibiting cell groups.

Consciousness comes to the rescue of the organism at just these places where instinctive and habitual ways of controlling actions are not adequate. The inhibition and control of the lower centers by the higher, the checking of

the low-grade response, is the occasion for states of consciousness to appear. These states of consciousness do not take the place of the high-grade nerve actions in the case, but are the regular and necessary partners in the psychophysical activity of these high-grade, accommodating, inhibitory, brain-cell activities.

In addition, then, to the general properties of sensitivity and conductivity of the neurones, we have in the brain cells the general property of coöperative activity or harmonization, and that of plasticity which shows itself in the development of brain-cell activity in the two ways,—habit and accommodation,—while the cells which develop in the latter way are commonly thought to possess the property of inhibition.

In the chapters to come we shall have occasion to speak further of the behavior of the nervous system in various connections, for example in the treatment of sensation, memory, feeling, association, etc. In the next chapter its general function of plasticity will receive considerable attention, as we shall there discuss the simpler adaptive processes of the organism,—instinct, impulse, and especially habit. These three processes are founded in the nature of the nervous system. The physiological, psychological, and practical aspects of habit will be outlined and their importance made clear.

REFERENCES

- THORNDIKE. *Elements of Psychology*, Chapters IX and X.
ANGELL. *Psychology*, Chapter II.
HALLECK. *Education of the Central Nervous System*, Chapter I.
JUDD. *Psychology*, Chapter III.
HOUGH AND SEDGWICK. *The Human Mechanism*, Chapter XV.

For a more extended account a large text on physiology should be consulted, e.g. HALLIBURTON: *Kirkes' Handbook of Physiology* (twenty-first edition), Chapters VII, XV, XVII, and XLI-L.

CHAPTER IV

THE SIMPLE PROCESSES OF ADAPTATION : INSTINCT, IMPULSE, AND HABIT

In this chapter will be considered the primary and fundamental ways of the adaptation of the organism to the conditions of its life. With the capital at hand in the fact of the nervous system, described in the last chapter, the question arises as to the uses to which the capital is put to make it most effective. Some of the ways of reaction are determined for the organism beforehand by its very structure. Others seem to be partially determined, while there is also a great deal of free capital to be used as each developing individual sees fit.

Automatic acts. Those ways of action which are determined for the individual by his inherited structure are, first, those which are extremely fixed in their character, the so-called automatic acts.

These are the necessary life functions of respiration, heartbeat and blood circulation, digestion, and processes of secretion. These acts have their nervous mechanism in the shape of stimulus carried along an afferent course, a registering of this by the appropriate nerve-cell groups, and a motor response. The stimulus comes from the condition of the organ concerned, and as the stimulus thus comes from within the organism, so is the response made in the inner workings of the body itself. Hence the name "automatic," as the process is a sort of perpetual-motion affair so long as the organism is alive. The nerves concerned

work with mechanical precision and are practically incapable of modification. They were thus inherited, and the individual has really nothing to say or do about them, except, of course, to refrain from disturbing them by his own waywardness. Automatic acts are not such as give rise to consciousness, unless they are disturbed. This way of action on the part of the organism, then, is of neither psychological nor practical concern.

Reflex acts. Another group of acts, very important for the adjustment of the organism to its environment, and yet over which it has little control, is the group known as "reflex acts." The nervous mechanism in the case is inherited. The stimulus comes from without, is simple in character, and the response is a single act which consciousness certainly is not responsible for. When the light becomes very bright the iris of the eye contracts. The finger which touches the very hot object is quickly drawn away. If the sole of the foot is tickled, a quick movement takes place. The cough and sneeze are practically irrepressible. Of some reflexes we are unconscious, and of others we are aware, but the latter seem as mechanical as the former. It is the inherited nervous structure that controls. This is responsive in each case to a particular form of stimulus, and given that, the action takes place. The latter statement, however, needs to be modified in the case of some reflexes which seem to depend on the condition of the organism at the time; as, for instance, the reaction to water, according to whether thirst is present or not.

Students of the psychology of children have discovered that some reflexes are present at birth, while others are not ready for action for days and even months. Professor Major, in his careful and instructive book, "First Steps

in Mental Growth," cites the following illustrations of early reflex hand movements:

When J. was four hours old, he firmly clasped a finger which was placed in the palm of his hand. On R.'s second day, when his cheek was lightly touched, his right hand made a quick and strong movement toward the face, as if to remove the disturbance. A light touch on J.'s forehead, while the child was asleep, caused, on the second day, the arm to fly up convulsively, the fingers to extend, and twitching of the facial muscles.

Some reflexes may be modified in part in their expression, but the simple, inherited, mechanical response to a definite, simple stimulus, independent of consciousness and often of the real needs of the whole organism, may be taken as the chief characteristic of reflex acts.

Next must be considered those acts of the organism which can be partially determined by the individual, and those which are practically free material for the individual to mold as he will. Under this general description come instinctive and impulsive actions, and it will be the purpose of this chapter to discuss these forms of action, and more especially their development into habit, and the formation and meaning of habit in the life of the organism. All the life of habit, and for that matter the whole life of action, must be developed from the original native tendencies of the organism. Into the relation between habit and these native tendencies, inquiry must, then, be made. In a later chapter the nature of the highest ranges of the life of action—the will and volition—will be discussed. In this chapter its more primary features will receive attention. Habit may be said to be the most fundamental feature of this life of action, both in the sense that the natural tendencies of the organism are with much or little modification formed into habits, and in the sense that these

habits in turn either determine our willed conduct or furnish the means for its realization.

Meaning of habit. The term "habit" is one in very common use and one that has a very broad significance. Perhaps its most common meaning is a settled, or practically settled, way of action. Although this routine aspect of habit is the one more commonly thought of, the other aspect is quite as important, if not more so. This other aspect is that habit is a way of doing something, or, in other words, the ability to do that thing. One's habit of walking means ability to walk; of pitching a ball, his measure of ability to pitch the ball. The term scarcely needs definition at present. If we think of any act that is habitual, or an act which one has the skill to perform and practice in performing, such as one's way of shaking hands, of swimming, or of writing, any habit or practical ability of great or little strength, of greater or less importance, enough will be suggested for our present purpose.

Physiological basis of habit. As we saw in Chapter III, it is upon the plasticity of the nervous system that all the matter of habit rests. The nerve cells get into more and more fixed ways of response to certain stimulations. Both in structure and function the plastic neurones become more determined. This means, according to our explanation of what is meant by habit, that the choice of the organism in the way of response gets more certain, fixed, and limited; but it also means increased ability on the part of the organism to perform its tasks in the way of ever better adjustment to the conditions of its life. All formation of habits, all the power of control over movements which the organism has, all the using of habitual powers, partially or completely formed, for further purposes of action, is a matter, on the physical side, of the development of the nerve

cells and their connections in muscles and sense organs. The plasticity of the nerve cells is, as we saw in the preceding chapter, a property providing not only for ever greater fixity in the way of response, but also for the modification, reform, and breaking up of these more or less fixed ways of response when occasion calls for it. Our discussion of the formation and development of habits must keep in view this double nature of the general property of plasticity.

The nature of instinct. It is not easy to distinguish instinctive reactions from reflex acts. The latter we found were not always unalterable, nor yet unattended with consciousness. When, however, acts of the general reflex type become more complex, and when each part of the complex series finds its meaning and value for the organism not in itself but as a part of the series, we may speak of the act as instinctive. Instincts, too, seem to be attended with more of consciousness than reflex acts and are more modifiable, or at least many of them are. The nest is built apparently without a conscious plan and without previous training. The older idea of the complete mystery of instinctive activity, and of its being a perfect performance and practically unalterable, does not seem to be borne out by modern research. It is very closely allied with reflex acts on the one hand, and with acquired habits on the other.

Instincts have been called inherited habits, or racial habits; and whether or not these definitions of instinct suggest a correct account of their origin, they seem to point out important features of their make-up and behavior. "Instinct," as James says, "is usually defined as the faculty of acting in such a way as to produce ends, without foresight of the ends, and without previous education in the performance." The higher animals are, as we know, the possessors of an abundance of instincts by means of which

they perform nearly all their activities. Human beings, likewise, are well provided with them; and by means of them, human infants are, with some help, enabled to survive.

The term "instinct" is somewhat loosely used and covers two rather distinct features of life. For instance, we speak of the instinct of self-preservation, the instinct of fear, of ownership, of pride, of parental love, etc. These are general instinctive, or natural, characteristics possessed by all sooner or later under the appropriate conditions. Under these general qualities we may classify those specific acts which are the instinctive expressions of the general qualities. These specific acts—the warding off of a blow, the sucking of the infant, the chick following the hen and pecking for its food, and the like—are more properly referred to as instincts. The term is used so generally, however, to indicate both the general quality and the specific acts that it will be better so to use it in our discussion. The context will, it is hoped, prevent any confusion in the matter.

Nervous basis of instinct. As each instinct is such a definite, certain affair in its nature,—the warding off of a blow, the dodging of a missile, the chick pecking its food,—there must be a very definite nervous organization providing for the appropriate act under the circumstances. This organization is hereditary, whether ready for complete action as soon as the organism is brought into the world or not. There is a complete nervous circuit practically ready for action. This circuit will consist of a sensory or afferent course, appropriate brain or central connections, and a motor or efferent course. When the appropriate stimulus is presented,—mentally a crude sensation or sense-perception, the sight, the sound of the objects, or the way they feel,—the nervous impulse or current takes the course which nature has provided for it. The definite stimulus is

connected in the brain with the appropriate expression, and so the act is performed. The hereditary character of these instincts is nature's provision for saving the lives of human beings as well as animals. This nervous arrangement may be, and usually is, a complex affair, a number of brain cells being involved.

We may say, then, that in the case of an instinct there is an inherited nervous arrangement consisting of a sensory course connecting with a motor course by a more or less complex series of associative tracts; that there must be a definite appropriate stimulus; and that the response is a comparatively fixed affair. This fixity is a firmly decided condition with the most deep-set instincts, while with those less deeply set the arrangement of centers, the stimulus, and the response are much less developed and definite. When compared with mechanical reflexes, instincts may seem comparatively uncertain in response, rather than fixed; as, for instance, what the child will do when in the presence of a dog for the first time. When compared with conduct of a deliberative, voluntary sort, the instinctive reaction seems very fixed and certain in outcome. The dog rather inevitably chases the cat, while the conduct of human beings in their dealings with one another is not easily predicted.

Instinct and impulse. There is, indeed, a gradation in this matter of fixedness of arrangement of nervous connections, of stimulus, of response, and of complexity. Those instincts which are simplest and which are not set into action by some one particular kind of stimulus, and which do not have any great fixity in the way of response, are frequently called impulses. They differ from the more deep-set instincts mainly in this matter of degree of fixedness. The nature and development of these more random

instinctive actions or impulses will be considered in a later section of this chapter. The early leg movements which develop into the habit of walking may be taken as an example. Also the early cries and noises out of which words are made in talking.

Instincts are all impulsive in their nature in the sense that they are active, native tendencies to adjust the organism to its environment and the environment to the individual's needs. Fear of any object calculated to produce it is, as we shall see later, an emotion, but it is impulsive as well, and because it is natural and because it leads to definiteness of action it is called an instinct. It thus happens that many such single experiences may, as conscious feelings, be called emotions; while, in so far as they are tendencies to act, they are impulsive, and in so far as this action tends to be of a particular sort, they are called instincts. So rich an affair is our experience that while it may at any time seem simple, various aspects of it have to be described by different names and under different topics.

Early and late appearance of instincts. It would be a mistake to suppose that all of our instincts appear in the very early life of the individual. Each seems to come to fullness of capacity for exercise when the individual organism needs it to adjust itself more exactly and fully to its environment. There is not space here to trace the time of appearance of each instinctive tendency. The sucking instinct has its proper time, so that of play, of mating, of ownership. Some instincts are present in the early helpless period of infancy, when they are essential to the very existence of the child. Many of them cease to be of use and are left behind as the development goes on. Some are always useful, such as dodging a missile. Some, such as ownership and pride,—instincts in the sense of general

tendencies of the individual, — are dominant throughout one's life, now reacting in one way, now in another, as the demands of life call for them and new occasions afford new exercise. This matter of the early and late appearance of instincts, their having a time of greatest strength and of decay, has important practical and educational bearings, as we shall see later.

Instinct and habit. We are now in a position to see the very close relation between instinct and habit. In a general way it may be said that instincts develop into habits. It must be remembered that the most deep-set instincts are already, for the individual, practically fixed ways of response, so that little development or modification is either possible or necessary. A little experience, however, in the exercise of instincts does lead generally to modification, or at least restricts the scope of their exercise. To quote from James: "When objects of a certain class elicit from an animal a certain sort of reaction, it often happens that the animal becomes partial to the first specimen of the class on which it has reacted, and will not afterwards react on any other specimen." James cites the selection on the part of the animal of a particular hole to live in, a particular mate, the nesting of a bird on the same bough time after time. It is the same way with human beings in the matter of their homes, etc. Before reacting on the particular features of the environment the instinct exists in a more general miscellaneous way. After such reactions there is a habitual definiteness about the activity which it did not possess before. Instincts may thus be modified by experience and develop into habits. "A habit once grafted on an instinctive tendency restricts the range of the tendency itself and keeps us from reacting on any but the habitual object, although other objects might just as well have been chosen

had they been the first comers." The more general the instinct is in its nature, — that is, if it exists merely as a general tendency, — the more will it be modified and molded by experience into a habit or a set of habits. The more unformed it is, the more necessary is experience to mold the random movements into useful habits. This feature of the case will be discussed in the treatment of impulse and the formation of habits.

Another important feature of the relation of instinct to habit arises from the waxing and waning of instincts already spoken of. Favorable opportunities, arising when the instinctive tendency is most active, will naturally lead very easily to the formation of habits along those lines. If favorable opportunities for exercise do not thus present themselves, the habit will not be formed and the instinct will probably die for lack of exercise. Take the case of the boy and the possibility of fishing. There comes a time in the life of the young boy when, encouraged by the example of others, nothing in the world seems to fit in with his natural bent like going a-fishing, say for brook trout. If he has the chance to go and if the conditions are generally favorable, he will very likely develop a rather strong brook-trout-fishing habit that may last all his life. If there is no chance for him in the matter of this form of sport, he will fail to develop a habit of fishing, and, when full grown, will wonder what enjoyment others can find in such an inane business.

If early instinctive tendencies result very unpleasantly, the tendency will be decidedly inhibited. If the dog bites or the cat scratches, when stroked by the little child, the probabilities are that very little stroking will be done, and the habit of stroking dogs and cats will fail to be formed.

Further principles involved in this matter of the relation of habit and instinct, and further explanation of the features here spoken of, will be brought out more fully later in the chapter. The important features which have already been brought out with respect to the nature of instincts are the following:

1. They are ready for exercise without previous education in their performance.

2. An instinct may exist as a general tendency of the organism, or it may be a decidedly definite, specific affair.

3. Instincts are provided for by an inherited nervous arrangement calling for a definite, particular sort of stimulation and giving particular, definite responses.

4. There is a greater and less fixity in the matter of nervous arrangement, stimulation, and response, the former belonging to the instincts as we commonly speak of them, and the latter to what are, perhaps, better termed impulses, though all instincts are impulsive or active.

5. Instincts may be early or late in appearing, and last a longer or a shorter time.

6. Instinct and habit are most closely related, in that instincts tend to be more or less modified by experience, and thus develop into habits if they have a chance for exercise. Otherwise, they are likely to die out and habits along such lines are not formed.

Impulse and the formation of habit. The nature of habit and the manner of its formation may best be considered in connection with the development of those freer, less definitely organized, more simple tendencies of the individual which we have called impulses. While the higher animals may rival man in the possession of instincts, the young human being is far superior to the animal in the possession of these free, indefinite, unorganized impulses. It is upon

these, mainly, that the human infant's development along the lines of habit, knowledge, and conduct depends. The question then arises, how do these impulses develop into habits? By habit, as explained above, is meant not only a customary, regular way of doing something, but the ability to do the thing in that way; or, in other words, habit consists of such a control over muscles that the act can be effectively performed.

For illustration, take the familiar case of the infant learning to reach out for and grasp an object. The sense stimuli coming through the eyes naturally awaken some response of the motor sort. But here there is no well-formed instinct, as in the case of the chick at the sight of the corn. Several impulsive motor tendencies of a random, struggling sort tend to appear. Legs, arms, head, body, are all set more or less in motion, — motion of a random, ineffective sort. The reason, nervously, for these random movements seems to be that the sensory stimulus, not being connected with a particular, definite motor response, overflows, as it were, into many channels, setting many muscles into motion at once. The same uncontrolled condition will be seen later in the case of a person in emotional excitement, before he settles down into effective action in the case. The problem becomes that of inhibiting or keeping quiet the great majority of these movements, and of selecting, encouraging, and putting together, or coördinating, the few arm and hand movements which we describe in our adult, knowing way as reaching for and grasping the object seen. The child solves the problem by keeping up all or many of the movements until something happens. The "something" that happens is the hand's chance coming in contact with the object. When this takes place, even once, there is a decided instinctive tendency to grasp that which the

hand touches. This chance contact and grasping means everything. This is success, this is most satisfying. The achievement has put upon it the great premium of the accompanying thrill of satisfaction. The achievement seems to be due only in small measure to conscious control. The nervous organism itself seems to "get the hang" of the successful response. The pleasurable thrill is rather the index that the object is attained. This act, or series of movements, tends to be repeated, and the other unnecessary movements tend to disappear. Of course this does not take place all at once. The child does the clever reaching one day, and seems unable to do it the next. The useless movements are more or less kept up for a considerable time. But the try-try-again attitude is still present. Again the lucky combination of movements arrives. There begins to dawn upon the child some consciousness of what it feels like and what it looks like to reach for that object and to come in contact with it and grasp it. There comes gradually to be established a connection between the sight of the object and the series of movements which succeeded in grasping the object. The child tends to repeat, and repeat again, this connected series of successful efforts. They please, and are thus unconsciously selected for use. The other movements, being of no especial use, tend to drop out. Their energy is no longer called for.

Learning to reach for and grasp an object thus seems to involve many random impulses gradually molded into shape, developing into a control over muscles which we call habit. The general tendency to reach and grasp is also an instinct, but one that requires practice to develop and make perfect. "Reaching and grasping," says Professor Major, "do not come forth full-fledged. They afford an excellent illustration of the slow development and perfection of an instinctive tendency."

“Beginning with R.’s tenth week observations were made of his impulse to reach and grasp a colored tassel which was frequently suspended within reaching distance of the child as he lay in his crib. From the first the sight of the object pleased him, calling forth arm-flourishing. In some of the arm flourishes the hand came in contact with the tassel, and on two different days during the tenth week it seemed that the child tried to grasp the object. . . .

“In the thirteenth week when they (objects held in front of him) did touch his hands the desire to get hold of them seemed to arise at once.” In the sixteenth week “when toys were held in front of the child he threw his arms about; and if, in so doing, he chanced to grasp the object, it was held. By the end of the seventeenth week, reaching and grasping were well established, needing only practice to render them sure and steady.”

After this general fashion, sooner or later, in an even more simple or vastly more complex way, are our habits and ways of performing all sorts of actions formed and developed. It is just because we have such an enormous number of these natural, more or less random, impulses, that we can develop from them so many simple and complex kinds of actions that will be of the greatest use to us in all the emergencies of living. And it is just because we are endowed with these random impulses, rather than with completely fashioned instincts, that we, as human beings, are capable of learning so much. For this learning we have the very long period of infancy and development as compared with that of the animals.

Concerning this development of impulses into habits a few features may be mentioned, suggested for the most part by the example just spoken of.

1. Impulses may be called into exercise by some stimulation from without, as the sight of the object in the instance quoted. They may also, it seems, be the expression of a general inward, organic restlessness, shown in wriggling movements of legs, arms, etc., and in crude vocal utterances.

2. These impulsive movements take place in an excessive, prodigal way at first.

3. For the performance of a definite useful act a few of these impulsive movements must be chosen and connected, and many inhibited.

4. This selection takes place by chance success, which puts the premium of satisfaction on the fortunate combination, the discount of failure and dissatisfaction on the un-availing movements.

5. The process is repeated till at last success is secured and the habit of performing the act (in our example, the reaching for the object), or the ability to do it, has been acquired, the child by his own activity thus adjusting himself to his environment.

Imitation, suggestion, and play. Some further examination of the factors involved in the development of impulses into habits, or capabilities of action, may be spoken of. Much of this development takes place under the influence of the general instinctive tendency of the child to imitate. The child, we hear it said, is a born mimic. The greater part of this imitation is unconscious. In the imitative acts of the child, the place of the object reached for, in our example, is taken by an act of parent, other child, or some one else. This act must be imitated, learned, repeated. Here also the try-try-again attitude is brought to the front. Take the case of the child learning to talk. Sounds of a crude nature are being produced. Some word is spoken carefully,

slowly, by the parent. Such simple words as "papa," "mamma," are usually tried first. These are much like some of the instinctive babblings of the child. The child tries to sound the word, tries again, repeats, modifies, until his utterance is much like the copy. His copying is simply a modifying and a combining of his own vocal utterances. At first, as Stout says, "the child's imitative actions tend to resemble his own previous performances rather than his model." A premium is put upon the child's successful efforts. The repetition of the copy, the smiles and general attitude of approval of the parents as the trial approaches perfection, the satisfaction of the child as the sounds of model and performance become more and more alike, — all these things tend to the development of the proper habit or power. Other examples would show practically the same process. When the imitation becomes more conscious, the process does not change.

When the child has thus obtained control of many movements, when he has thus a considerable stock of habits and capabilities, and when his mental life is stronger, he begins to attempt many acts which are no longer directly imitative but are in some way suggested to him. An idea of doing some particular act is presented to him. He is now able to show his originality somewhat. He experiments. He utilizes his old powers and habits in new combinations to try to work out his idea. In so far as he succeeds in working out his idea, he gets further control of his powers, his random impulsive tendencies. He becomes freer, more independent, in working to his ends and purposes the suggested ideas, than in the more slavish imitation.

Next comes the real play of the child. Here he uses his stock of habits which he has acquired in his first adjustments to his environment, in his imitative activities, and in

his further attempts which are the result of suggestions. Here he is even more free in his activity. He combines and recombines in all sorts of ways, as occur to his imagination, all his capabilities. He is guided much by imitation in that he sees what others are doing at work or play, and by suggestion in being told about the play. But in whatever channel his imagination runs, he is ever, with all his free spontaneous powers, striving to realize new ends and purposes; that is, is ever forming new habits and developing new powers. In these plays he begins to learn himself and his world pretty thoroughly, the thoroughness depending largely upon the freedom, the spontaneity, and the delight of the occupation. We thus see that in addition to the direct adjustment to environment on the part of the child, in getting control of his natural random impulses and forming them into habits and capabilities, we have as further guiding principles in this process the deep-lying instinctive tendencies toward unconscious and conscious imitation, toward the more ideational working out of suggestion from others, and toward that great life of play — active, spontaneous, and delightful — in which the child learns so thoroughly so many new useful habits and capabilities.

Habit as nerve functioning. Let us now return to the discussion in an earlier part of this chapter and see more carefully, and in terms of the plasticity of the nervous system, how all this development of impulses, and instinct as well, into habits takes place. We can then proceed to consider the further mental and practical features of habit, the importance of habit from a practical and educational point of view, and some suggestions as to the training of habit.

We have seen that specific instinctive acts are practically inherited habits of action, and that, while they are somewhat modified by experience, they undergo little change,

and that mostly in the way of settling down into a narrow habitual range. The development of further habits takes place largely under the direction of what we have called general instinctive tendencies, such as fear, pride, emulation, ownership, imitation, play, etc. The great achievement of habit-forming is connected with those simple random instinctive tendencies which we have called impulses, for example, wriggling movements of arms, hands, legs, or vocal organs. Evidently, then, one great principle of the formation of habit is that the nature of the organism itself determines beforehand, in a measure, what habits shall be formed and capacities developed. This is very clearly true of the simple instincts, such as the sucking of the infant and the clasping by the hand of objects with which it comes in contact. It is true as well of the more undeveloped impulses acting under general instinctive tendencies, for these are the material to be molded. The nature of the material will in a way determine what shall be made from it.

The second principle may be thus stated: Owing to the plasticity of the neurones, the nervous impulse or current tends to pass a second time over a course where it has passed before with success and satisfaction for the organism. The third and fourth times are still easier, and so on, the habit becoming more and more fixed with each action. When the nervous impulse or current directs movements which are out of accord with the end desired, and especially when they bring painful consequences, these nervous currents tend to be inhibited. The burnt child dreads the fire and will not reach for the flame more than once or twice. The movements which, as in the example, take him away from the desired object will not tend to be tried again. The vocal sounds which are unlike the word repeated by

the parent will not tend to be hardened into habit. The second principle of habit might have been thus stated: The nervous impulse or current tends to pass a second time over a course where it has once passed, provided evident failure and pain have not resulted as a consequence of the movement thus set up. James says that "an acquired habit is nothing but a new pathway of discharge formed in the brain by which certain incoming currents ever afterward tend to escape." The forming of habits is thus an inevitable affair for such an active organism as the young human being is. Many of these habits require considerable effort in their formation, but they are all important, for these habits are the powers and capabilities which the individual has, for better or worse, for his use as he goes on living. Each action in response to stimulation, each attempt to accomplish an end, results in the development of some habit, either in the direction of confirming more and more one already well formed, or in the way of working over and using some of our habits and powers for bringing to pass some new end or purpose.

Uses and training of habit. There are, then, as was pointed out at the conclusion of the last chapter, two chief ways of the development of habit, or two chief functions of habit. The first is what the more common use of the term "habit" suggests,—the settling into fixed mechanical ways of acting and the practiced ability to perform certain acts. That this shall take place in great measure all through the range of the active life of the individual is of the utmost importance. We learn early and with lasting effect, in a most routine, habitual way, at least nine tenths of our ordinary actions. Talking, walking, dressing, reading, avoiding obstacles in the street, greeting acquaintances, whistling, playing games,—all these and a thousand and one others are

turned over to the control of habitual, practically involuntary nervous courses. This is the great economy of living. It extends all through the range of one's activity. Even the higher moral and intellectual life gets into ruts or fixed ways of behavior. Early in life such habits are securely formed, and after a few years we may think we are able to change them, and no doubt in a measure we are, but at any rate we seldom do.

With respect to this first feature of habit, the fixed mechanical one, it may be said :

1. The more fixed and mechanical our actions become, the less attention is given to them, the less we are conscious of them. Habit takes care of the act of walking; we only think out and determine where we wish to go. In speaking and writing our attention is given to the thought to be expressed, not to the habitual way of expressing it.

2. Habit makes our actions more efficient, for it eliminates the useless movements and makes the necessary ones both quick and accurate. The clever workman has a great advantage over the clumsy apprentice, the good tennis player is the despair of the beginner. The clever workman and the skillful player have their respective habits well formed. The beginners, giving all their attention to their strokes, are clumsy, inaccurate, go through many useless motions, and are much more weary at the end of the work or the game than the expert. The difference is just a matter of the proper forming of habit.

The second way of the development of habit and of the function of habit is its possibility of being used, or reformed, or indeed broken up altogether. This feature of habit is no less important than the first. It suggests that for which the habit exists, namely, to bring about ends or purposes which the individual wants. To succeed in achieving such ends

is the purpose of all action, and habits to be true to their place in human life must be subordinate in this way to the purposes of the possessor.

1. The using of habits. Habits are for the most part used to achieve other purposes than just their own exercise. We walk to get somewhere. We speak to utter our thoughts. We even whistle to keep up our courage. We add, subtract, multiply, and divide, not for the sake of performing those operations, but, after their first learning, for working out our simple or complex arithmetical problems. These simple mechanical habits find their reason for being in their furnishing the easy and effective means of performing our ordinary tasks.

2. The reforming of habits. It frequently happens that we have new ends or purposes to be brought about which our routine habits will not achieve. Our old habits and ways of action must then be modified and rearranged. If our habits are thus flexible, we can succeed in performing the new task. If they are not thus flexible, we are helplessly old foggy. The perfect development of habit calls for such a degree of flexibility that modification can be made when the new occasion calls for it. The child who has learned a poor style of writing and of holding the pen must take on the new and better way if he is to write well. The rough-and-tumble football player must reform his ways under the direction of the skillful coach or he cannot make the team. The merchant must change his old habits of business if he is to succeed under the changed conditions. Habit, if normal, is thus under the control of its possessor in the way of modification so as to achieve new purposes, to meet new conditions, to perfect an art. When habit becomes hopelessly fixed, it becomes an unnatural, undesirable development.

3. The breaking of habits. It frequently happens that for the best development of the person, habits must be broken. These are what we call bad or unfortunate habits. Habits may be broken (*a*) by strongly determining to do so, and by trying to do something else instead. If a new possibility of action is held before the mind, if one gets, perhaps, new acquaintances, changes his haunts, takes on some new obligation, the old habit may succumb. (*b*) By not making the mistake of willingly going back to the old habit "just for once." Let the nervous impulse or current rush through the old channel again, and the inhibiting influences seem to lose their place, swept away by the current. James says: "Each lapse is like the letting fall of a ball of string which one is carefully winding up; a single slip undoes more than a great many turns will wind again." (*c*) By acting quickly and strongly upon the new idea and feeling, and by putting away as far as possible the chance for performing the old act and the feelings which tend to linger in the mind about it.

We have thus outlined the nature of those simple adaptive processes whereby the organism tends to adjust itself to the conditions of its life. The automatic acts were cited as necessary mechanical features of conditions of life. So, in a measure, were the reflex acts almost as necessary and mechanical as the automatic acts. At a higher stage we find the highly important instinctive acts and tendencies, mechanical in a measure and yet developing somewhat into habits. Then there are the random impulsive tendencies, good material, indeed, the marked possession of the human species, but not of much use until developed into controlled powers called habits. Lastly and most important in our discussion we found that habits, developed partly from instincts and mostly from impulses, become the great means

whereby the organism adapts itself to its environment. The relation of habits to the whole range of mental processes, and especially to that highest grade of adaptive adjustment known as voluntary conduct, will appear as we proceed.

Practical and educational applications. As the concluding part of this chapter we shall point out some features of the practical and educational importance of habit, and also some of those aspects of the formation of habits which ought to be taken into consideration by all who have responsibility in the matter of training the young.

It is perhaps not too much to say that education consists in the forming of good and useful habits and in the avoidance of those habits which are useless and harmful. Physically, mentally, and morally we are bundles of habits. By forming right habits our bodies become ready, accurate, and economical servants for the carrying out of all the purposes of our desires and ideals. By forming right mental habits we are enabled to perceive, remember, and reason with correctness and efficiency, and are able to learn and to use our knowledge to advantage. By forming right habits morally we tend to have worthy inclinations and desires, to choose the good and shun the evil, to follow out in our conduct those lines of action which are of highest worth, to behave individually and socially so that the things individually and socially worth while may be effectually achieved. If the whole life then, physical, mental, and moral, becomes in such a measure a matter of habit, it is of the utmost importance that parents, teachers, and pupils themselves should use all their powers that right and useful habits may be formed, and character, which is but settled habit of will, become sound and strong.

In order that some useful practical and educational precepts may be drawn from the discussion of the nature of

instinct, impulse, and the formation of habit, we must recall certain features of that discussion. An early section of the chapter suggests that habits are formed by doing, by action. It is the actual response to stimulation that counts in forming habits. This is true throughout the whole range of habits, physical, mental, and moral. We certainly "learn by doing." It is not enough to wish or even to regret. Whether it is a matter of learning to play baseball, of becoming familiar with arithmetical processes, of writing good English, of telling the truth, or of being kind to one's neighbor, faithful, persistent action, or doing or attempting to do these things, is the fundamental feature of habit-forming. The neurones are indeed plastic, but it is only through stimulus and response that this plasticity can be taken advantage of. The organism is a decidedly active affair, and the forming of right habits is a matter of rightly controlling these activities.

With respect to instincts in the matter of the development of right habits, much more can be said in an educational way of instinct in the sense of general instinctive tendency than in the sense of specific reflexive act. These deep-set tendencies are the great inner forces with which the teacher must reckon. To mention some of them will suggest their availability: love and sympathy, anger, fear, curiosity, rivalry, ownership, constructiveness, imitation, play, pugnacity. It would take too much space here to attempt to show in what ways each of these may be used in the formation of habits. It is easily seen that love and sympathy between the child and his teachers may call out activities of the child in connection with his work which will be of the greatest use in the development of useful actions and ideas. For the curiosity of the child, the parent and the teacher may well be thankful and take courage. Rivalry

or emulation is a most useful spur to action. Ownership, the desire to possess, shows early, and may be made the basis of attention to many things, — books, specimens, etc.; and the acquirement of these will mean much in directing the thought and the action of the pupil. Constructiveness, the tendency to make and to build, a natural expression of motor impulse, may, in all grades from the lowest up, in kindergarten play, in map-drawing, in manual training, etc., be called into exercise so as decidedly to mold habits of action and thought. Modern schools are true to the psychology of the case when they insist on “learning by doing,” and in the forming of many of the most-exact and useful ideas and habits by means of activity of the instinctively constructive sort. Imitation and play have already been referred to in connection with the formation of habit from impulse, and further reference will be made to them in the next section. Much can be said of the instinctive tendencies of the pride-pugnacity sort. If an appeal can be made to the will-not-be-downed spirit of the pupil in connection with hard lessons or difficult examples, we are likely to get the pupil at his best for mastery of his task, and right and useful habits of action and of thought will be the likely result.

Another feature of instinct, as pointed out above, the teacher must keep in mind. Appeal to the instincts which are uppermost in the child’s mind at the time. Instincts tend to ripen and decay. Imitation may be a stronger tendency at one time than at another. So with rivalry, constructiveness, pride, and ownership. Watch for the outcroppings of these tendencies and at the right time make provision for their fullest exercise. Subjects of study should be selected, tasks of action set, and methods employed, with full cognizance of the growth of these tendencies, their ripening

and decay. We can simply call attention here to the existence and very general nature of these instinctive tendencies, and suggest that they be watched for attentively and used as much as may be.

Passing more directly to the matter of the development of habits from what we have called impulses, many suggestions of vital importance for the work of the teacher may be made. Perhaps the most fundamental one is this, that all education, all forming of habits of thought and action, must be self-education. It is only by action on the part of the individual that his nervous organism can be developed. This was seen to be the case in reaching for the object, in learning to walk, to talk, etc. Only by this activity of the organism itself can response be organically connected with impression. Growth in habits must be self-growth, just as the growth of a tree must be. The growing boy must educate himself, first, last, and all the time, by his own self-activity, just as by that same self-activity must the child learn to reach for the object, to creep, walk, or talk. It would be just as foolish for the teacher to think that she could teach the child to reach for and grasp the object and to walk by carrying the child to the object or the object to the child, as to imagine that she can by her carrying efforts make the child learn that which is good and useful, and build up for him a desirable set of habits, a useful body of knowledge, and a worthy character. This is, as we have seen, the fundamental feature of habit; and in order that any education, any development of right and useful habits of thought and action may come about, there must be, to begin with, this basal organic self-activity on the part of the individual boy or girl. No effort of others, no amount of instruction or richness of environment, can take its place.

In this connection it should also be noticed that self-activity means expression as well as impression. The organism must be open to stimulation or impression; it must correlate these impressions, assimilate them mentally; and in order that the ideas may be made clear, and that the habit, mental, moral, or physical, may be thoroughly ingrained and tested, expression is essential. Bryan, in "The Basis of Practical Teaching," page 42, says: "There is, however, another psychologic fact just as fundamental and true, but not so familiar; namely, that our expression of an idea tends to clarify it, and at the same time determines more or less the direction and strength of the ideas that follow. A fact never to be forgotten is that the life to be expressed is affected by the expression just as truly as the expression is affected by the life to be expressed. Students should be encouraged to express themselves. The opportunities for expression in the schoolroom should be numerous and varied, — opportunities for oral expression, written expression, drawing, music, manual training of all kinds. Three opportunities, then, the school should afford the student: an opportunity for varied stimulations to useful mental activities; an opportunity for mental digestion, mental assimilation; and greater opportunities than have heretofore been given him for fullness and richness of expression."

Second only in importance to this is the place taken in the tuition or development of habits of thought and action by influences outside the child's organism, influences of parents, teachers, other people, especially children, and of the environment generally. Important as these influences are, it must not be forgotten that they are but aids in the development process. They are so important, however, that normal development is utterly dependent on them. What

habits shall be formed depends largely on these outside conditions.

Normal development is dependent on suggestion from people and environment generally. The developing life of the child can be in great measure controlled by control of the situations and of the stimuli. If situations and stimuli are controlled, it will be a control of impressions and hence largely of responses; in other words, of habits. Tuition by others and by circumstances is thus second only to self-tuition by self-activity. The two naturally work together. The point of control is the stimulus, and it is at this point that teachers and guides of the young should give themselves concern.

As the total environment of the developing youth, physical, social, æsthetic, and otherwise, is of such importance in the matter of the formation of habits of thought, feeling, and action, it follows, of course, that the greatest care should be exercised in the provision for this environment. While, as we have seen, the native tendencies of the youth count for much in determining habit, yet what the boy learns, how he behaves, what his attitudes are, is after all largely in the hands of parents, teachers, and associates.

Let us recall from the discussion on pages 65 and 70 certain features of the process by which the environment molds the child. Success and satisfaction as the results of behavior tend to fix that behavior in a habitual way. Failure to achieve the purpose, or unpleasantness in pursuit or attainment, tend to inhibit such activities. Parents and teachers may have a part in this process by so modifying or preparing the various features of environment that the successes and satisfactions of the child may be found in the right and useful channels of thought, action, and feeling.

Again, imitation and play are, as we have seen, decided features of influence in the child's development. Much of the influence of teachers, parents, and others comes about in these ways. Nor is this simply a matter of the early efforts, such as learning to talk, where the child by his try-try-again efforts at last successfully imitates the simplest words. Habits of talking and walking, general manners, general notions and individual ideas, feeling and attitudes, likes and dislikes, habits of respect, admiration, etc., — all these are developed in the child in the course of his early life in slavish and free imitation, and in play. In so far as parents and teachers can control the situation as to what shall be imitated, may they hope really to mold the child.

It is not simply a case, however, of providing conditions for the child to react upon. The parent and teacher may legitimately encourage the desirable features of the development. Smiles, praise, rewards, premiums of various sorts, may be safely and to great advantage put upon the more or less successful attempts on the part of the child to do the things which are of the desirable sort. Frownings, discouragements, and even punishments, if wisely used, may be applied to great advantage to prevent the development of habits of an undesirable sort. These satisfactions in connection with certain ways of behaving, and unpleasantnesses in connection with certain other ways, when shrewdly used by parents and teachers, may be very effective. The greatest care should be taken, however, that they shall be of the most helpful sort, shall be natural rather than arbitrary, supplementing the further experiences of the child with respect to his environment.

In this part of the discussion attention should be called to the matter of the reform of habits. In discussing this above, it was said that the perfect development of habit calls

for such a degree of flexibility that modification can be made when new occasion calls for it. Habits of thought and action should be constantly used so as to bring about useful ends and purposes, the solving of questions of knowledge and of conduct. As these questions vary, different feelings, ideas, and powers of all kinds will be brought into use, or at least there will need to be new combinations of ideas and movements. If the training of the child is of the best sort, the whole attitude of the child will be such that, barring the most mechanical habits of action and thought, his powers of thought and movement will be ever at his command for further use. His whole mental habit and temper will be neither radical nor conservative, but progressive. He will then be adaptable and alert, and as efficient as it is in his power to be. He will not be inert, mechanical, old foggy. This habit and temper may be cultivated in all the child's school work and in his general physical, moral, and social training. The meaning and purpose of social and ethical rules and efforts gradually appear as these rules release their blind claim on the youth and as they are more freely and intelligently used. So with mechanical ways of physical performance of tasks, and with hygienic rules for the welfare of the body.

In school work, especially in the growth of knowledge and of habits of thought, this principle is of direct, useful application. The knowledge and thought habits already in the possession of the pupil must be constantly, freely, and flexibly used in order that new problems may be solved, new knowledge obtained, and new habits of thought formed. More will be made of this principle later on in our discussion, but it is important here. Any lesson in school in any subject — geography, history, arithmetic, geometry, or any other — can be understood only in terms of what

has gone before, and this lesson becomes in turn a means toward understanding many others. Take a geometry lesson, for example. It is not enough to define a triangle, though a preliminary definition must be gained somehow. The different kinds of triangles, the equality or inequality of triangles under certain specified conditions, relations of sides and angles, of exterior and interior angles, the measurement of the three angles, etc., — all these things and many other properties of triangles follow along one after another. The point here is that each is used in turn in understanding the next, and the triangle itself is understood in relation to other geometrical figures. The thought habit develops naturally and usefully concerning the triangle. In such ways the pupil's habits of thought may be made useful, and the value of habit realized.

The principle of the natural and free use of certain habits, or practical abilities already gained, for the sake of gaining further useful and more complex habits and capacities, may be applied as well outside of school. While the organism is still in its plastic state, it may best adapt itself to the varying conditions of its life by utilizing its capital already acquired. This is the way of natural progress.

Habits should be used in gaining further and more complex habits. What is already known and under control should be used for further achievement. This is the best way to repeat habits, and shows their proper function, which is progressive control over life's conditions. Whatever is learned should be flexible, capable of further use in various connections. That habit is normally a progressive affair should thus be realized in school practice and held up consciously as an ideal.

We have thus in this chapter pointed out the nature of the simple processes of adjustment, and some practical

methods by which these processes may best be acquired, developed, and used. It is suggested that the reader endeavor to illustrate for himself by some first-hand observations and some specific applications the various principles involved.

In the next two chapters we shall go on to discuss more directly the nature of those conscious processes — sensation and sense-perception — which may be called the processes of mind resulting from stimulation of the sense organs. For the larger and more complex adjustment of the organism to the conditions of its life in a conscious way, these sense processes must first be taken into account, for they are the channels through which the information comes which will, in turn, challenge the powers of the organism to intelligent and skillful movements.

REFERENCES

- JAMES. Psychology, Briefer Course, Chapters X and XXV.
JAMES. Talks to Teachers, Chapters III-VIII inclusive.
ANGELL. Psychology, Chapters III, XV, XVI, XVII.
JUDD. Psychology, Chapter VIII.
THORNDIKE. Elements of Psychology, Sections 31-34.
THORNDIKE. Principles of Teaching, Chapter III.

CHAPTER V

THE SIMPLE PROCESSES OF SENSE STIMULATION: SENSATION

As the stream of consciousness flows on in our ordinary experience, we are constantly perceiving objects and having ideas of objects remembered or imagined. Take any such perception or idea and notice its make-up. To be specific, let us take for example one's perception or idea of an orange. When the orange is taken hold of, it feels warm or cool to the hand. It has its own peculiar taste. Such experiences which we have of coolness or warmth, of taste, and of such other qualities as the color of the orange, its weight, roundness, softness, etc., go to make up our idea or perception of the object called an orange. Our ideas or perceptions of objects are thus made up of distinguishable factors.

Some of these factors we can analyze further and others we cannot. When we have completed the analysis, the factors of our idea or perception may be called mental elements. In the case of the orange, we have the simple factors of coolness or warmth as the case may be, its pure orange color, its pressure on the hand, indicating its weight, etc. The taste may be analyzed further as we shall see later. These elemental factors of the idea or perception, not to be analyzed any further as items of our consciousness, are called sensation elements, or *sensations*. The coolness or warmth is a sensation; the fragrance of the orange is a sensation; the color of the orange is a sensation; its sweet taste is a sensation; its slightly bitter taste is a sensation. And so with its other elementary features.

When our eyes are stimulated in certain ways we are conscious of colors. We get sounds through our ears, smells by means of the nose, tastes by means of the tongue, and so on. These sensations which we may have, then, depend upon the stimulation of our sense organs — eyes, ears, tongue, etc. — in certain ways. When this action upon the sense organ takes place, the stimulus is carried along the sensory nerve course, centers in the brain are caused to act, and the result in consciousness is a sensation or group of sensations.

Definition. Our definition of sensation, then, must take into the account its elemental or simple nature as a conscious affair, its relation to the bodily organs, and also its ordinary use in mental life, that is for the purpose of forming perceptions or ideas. Let us, then, take the definition of Professor Titchener, adding this last feature. "Sensations are those elemental conscious processes which are connected with bodily processes in definite bodily organs," and which are commonly used for building up our ideas or perceptions of physical objects.

Early sense experience. The organism is from the first, as we have seen, an active affair, instinctively and impulsively adjusting itself to its environment and using that environment for its own purposes. Now all this activity, in so far as it has results in consciousness, gives rise to sensations, the natural outcome of stimulations and activities in the various parts of the body. Conscious sense experience will come both from the stimulations to the reactions, and also in turn as a result of the reactions themselves.

These sense impressions which the infant experiences are important. Of course the infant is not conscious of them in the knowing way in which they appeal to the more mature person. The early sense experience of the child must be a very crude and vague affair. The conscious

processes are not so important at this stage of development as they become later, when more responsible and more voluntary direction of conduct by consciousness is called for. They seem quite incidental in reflex and instinctive acts. They gradually grow of more importance as the impulses are developing into habits. Then the necessities of life demand that more attention shall be given to them. The sensory experiences become less vague and more clearly noticed, as the need arises for finer adjustment of conduct to the conditions of life. The conscious sense experiences then become more definite and clear, more intense, more real.

Sensation and perception. This early mass of sensation life develops in two ways. First, each sensation gets to be noticed for what it is in itself. The red color is red as distinguished from blue. Hunger is hunger and not thirst. These sensations come to be known for their qualities. This is the way the more mature person knows them. Second, we have the more important part of the development. The sensation comes to be grouped with other sensations, and we have perceptions and ideas. When, now, a sensation is experienced, it means something, and something further than just itself. The odor of the savory dish is not a mere odor, but stands for the food. The sound of the bell may be not merely a sound but a summons, the bell ringing for breakfast. The sound of the clock's tick is different, as a mere sound sensation, for the infant from what it comes to be for the adult. And so our sensations come to have a meaning with reference to things. They become parts of perceptions of objects. They are the signs of the objects, and we act accordingly.

If we think of the early sense experiences as being of the crude, vague sort mentioned above, and if we then think of the ever growing attention which must be given to these

sense experiences on account of the ever greater need for new and complex adjustments, it is not difficult to follow what happens. In Chapter VII we shall see more clearly how the attention works, but we can anticipate here by saying that it has two results in the conscious material it works with, — namely, that it discriminates so as to make clear the noticeable features; and it also tends to group these distinguishable features into parts of the whole affair which it began to attend to. Now in the case of the crude sensory material we are speaking of, the results of attention to it will be the two mentioned in the last paragraph. The distinguishable features will be the sensations, and the whole group of them, thought of as a unit, will be the sense-perception of the objects concerned.

In adult life we need, accordingly, considerable introspection in order to notice the sensation by itself as an element of consciousness, for of course our experience of it is as a part of our perceptions or ideas of objects, and our interests and our necessities for action are with the objects of sense rather than with the distinguishable sensation factors. For example, the orange above mentioned may be thought of in the usual way, with the qualities fused together, — that is, the orange, or one's idea of the orange, the use of the orange, etc.; while in order to notice the sensations out of which the perception of the orange is made, some attention must be given to the individual features or qualities of the object, such as the color. The actual experiences which we have being of perceptions of objects, the sensation is rather an abstract affair and is not easy to single out. Professor Titchener says: "The rule for introspection in the sphere of sensation is as follows: Be as attentive as possible to the object or process which gives rise to the sensation, and, when the object is removed or

the process completed, recall the sensation by an act of memory as vividly and completely as you can."

Classification of sensations. In order to understand the nature of sensations a classification seems desirable, and one is readily suggested. Colors are different from sounds, sounds from tastes, tastes from pressure on the skin, and so on. Each sensation comes, of course, from the stimulation of some part of the body. Our classification may then roughly follow that of the bodily organs. And so we have a classification like the following:

SENSATIONS	FROM STIMULATIONS OF
Sight	eyes
Hearing	ears
Taste	tongue
Smell	nose
Temperature	skin
Touch or pressure	skin
Pain	skin
Muscular	muscles
Tendinous	tendons
Articular	joints

There are certain other sensations such as those connected with respiration, the circulation of the blood, digestion, etc., usually referred to as organic sensations; but these are of little importance for the growth of our perceptions and ideas, and need not be taken into the account here.

The attributes of sensation. This classification of sensations, while based largely on the differences in sense organs, is at the same time a classification according to the qualities of the sensations themselves. The quality of a sensation is that which makes it what it is; that is, distinguishes it in its nature from other sensations. A salt taste is different from a red color in quality. So is a salt taste different

from a sweet taste. The quality of a sensation is the most important thing about it, its essence, so to speak.

Sensations differ also in quantity or intensity. A taste may be slightly bitter or very bitter. A sound may be low or loud. Each qualitatively different sensation may be, with modifications noted hereafter, experienced in different degrees of intensity.

Sensations differ, too, in the matter of their duration. A sensation may last a longer or a shorter time.

Titchener, in his recent work "A Text-book of Psychology," adds clearness as an essential feature of sensation. When a sensation is directly attended to, its clearness is greater than when it is outside the focus of consciousness. A certain degree of clearness, thus it would seem, belongs to every sensation.

These, then, are the chief features or attributes of sensation, belonging to each sensation we may have: quality, intensity, duration, and clearness. The attribute of extensity, or spread-out-ness, also belongs to some sensations, such as those of the visual and pressure sort.

Sight sensations. In passing to an account of the special sensations, or sensation qualities, the most important and probably the most familiar are those of vision. What sensations do we get by seeing? We get sensations of color, and those of neutral tints, or brightness sensations. Undoubtedly we see objects, their size, shape, etc., but as we shall find later, these mental experiences are not simple sensations, but perceptions built up out of sensation material in rather subtle fashion.

The brightness sensations include white, black, and all the grays. The words "white" and "black" seem to indicate more than one distinct sense quality, and we may speak of the whites and the blacks. If we start with white we may pass to that tint which is just gray enough to be distinguished

from white, and then from this to the next darker, and so on through all the grays to black. Each will differ from the one before it by being a little darker. In this way we can find out how many sensations of brightness, differing in quality, we may have. By careful experimentation it has been found that the normal practiced eye can distinguish between six hundred and seven hundred of these grays, including the whites and the blacks. In our ordinary language, in speaking of the grays we use only the three terms, "gray," "light gray," and "dark gray." This is, of course, only for our practical convenience, and without experimenting we are aware that there are many light grays and many dark grays. Black and white, while not colors, are just as real, as sensations, as the various grays or the spectral colors. Whiteness and blackness we notice as real qualities of objects. To see black is very different from seeing nothing at all. It must be remembered in talking of the number of sensation qualities that we may have, both here in the matter of brightness sensations and with respect to other groups, that we do not have or use in ordinary experience anything like as many different qualities as experiments show that it is possible for us to have. Our discrimination in such matters is only as fine as our needs call for.

The colors of the spectrum are red, orange, yellow, green, blue, indigo blue, and violet. Purple, a color compounded of red and violet, and appearing for sensation to be between them, is usually added to the list. Let ordinary sunlight pass through a prism and these colors may be noticed. They shade into one another gradually, and between, for instance, yellow and green, we may notice several colors which we commonly call greenish yellow or yellowish green. Taking into account these transition colors, which for sensation and as sensation elements are just as real as the

accepted colors of the spectrum, we have a great number of pure simple colors. We have names for about twenty-five, and by careful experimental examination the eye can distinguish about one hundred fifty to one hundred sixty of these spectral color qualities.

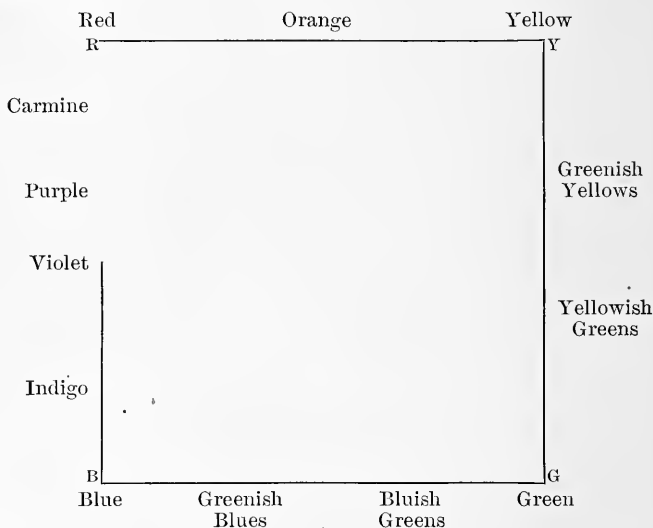


FIG. 11. The color square

There are certain colors — red, yellow, green, and blue — which are called the principal colors, and which according to some psychologists are the only really elemental colors. Orange seems to be between red and yellow, and there are the greenish yellows and the yellowish greens, between yellow and green; the bluish greens and the greenish blues, between green and blue; while indigo, violet, purple, carmine, etc., seem to be found on the way from blue to red. If we represent the matter by a square, we have the principal colors at the corners and the other colors on the successive lines forming the sides of the square.

From a purely psychological point of view, however, the mark of being a separate element would seem to be that it can be distinguished qualitatively from another; and so the one hundred fifty to one hundred sixty distinguishable qualities above mentioned would seem to be the real number of color elements in the pure spectral series. The distinguishable qualities between violet and red are of course not in the spectrum, and the break in a line from B to R of the square is intended to indicate this.

There are certain other colors, such as pink, brown, maroon, olive, and many others, which are not to be found in the spectrum, but which may be obtained by mixing one of the spectral colors with one of the grays. Maroon is a red infused with black. Pink results from the mixing of white light with the red of the spectrum. Olive is a darkened green. Brown comes from mixing black with yellow. Although not noticed in our ordinary experience beyond a limited number, it is possible by experimentation to detect an immense number of these shades, which are practically, as we see them, simple color qualities. About thirty thousand of these, according to Angell, and thirty-two thousand, according to Titchener, are observable.

We have then, as simple visual qualities, the six to seven hundred brightness qualities, the one hundred fifty to one hundred sixty spectral color qualities, and these thirty to thirty-two thousand just mentioned, making in all from thirty thousand seven hundred fifty to thirty-two thousand eight hundred sixty.

Complementary colors. Certain colors when mixed together, not as paint but by means of the color wheel for instance, produce a brightness sensation of grayish white. If the wheel is rotated rapidly, when a part of the disk shows one color and part another color, the colors do not

show separately (just as the spokes of a carriage wheel do not when at high speed), but a mixture of the colors is obtained. Colors which will combine in this way to produce grayish white are called complementary or antagonistic colors. Yellow and blue, green and purple, red and bluish green, orange and greenish blue, and some others are thus complementary.

After-images. If one looks out of a window on a sunny winter's day at the snow-covered ground, the field of vision will be white, broken by the straight, crossed, dark lines of the window sashes. If the eyes are then shut, the same sensations of light field with dark lines seem to persist. This is called a positive after-image. After a little, if one keeps the eyes closed, the light field of vision will become dark, crossed by the same lines of the sashes, but they will now seem light. This is called the negative after-image. In colors the same effect is produced by any pair of complementary colors that is shown in this example by the light and dark features.

Color contrast. If a slip of gray paper is laid upon a black background, and another slip of the same gray paper is laid upon a white background, the former slip of gray will look much lighter than the other one. If a slip of gray paper is laid upon any colored surface, it will tend to lose its plain grayness and will seem to shade into the color complementary to the one on which the gray slip was placed. Thus a gray slip of paper on a green background will look somewhat reddish, and upon a blue background will look somewhat yellowish. Complementary colors if placed side by side will each be accentuated; blue with yellow will make the blue look bluer and the yellow yellower. These cases illustrate what is meant by color contrast, and go to show that the visual sensations obtained from any object are largely modified by surrounding objects.

The eye as an organ for seeing is usually compared to a photographer's camera. There is the dark chamber on the back of which is a sensitive curtain, the retina. In front there is a lens through which the rays of light come. The retina is composed of nervous elements sensitive to the stimulation of the light rays. In the center of the retina is its most sensitive part, called the yellow spot. The retina is directly connected with the optic nerve, which carries the stimulations along to the brain centers concerned in seeing.

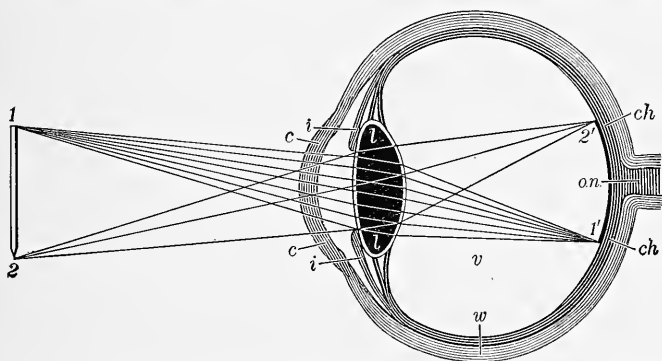


FIG. 12. Diagram showing the formation of an image on the retina

1, 2, the object; 1', 2', the image of the same; *c*, cornea; *i*, iris; *l*, lens; *v*, vitreous humor; *w*, sclerotic; *ch*, choroid; *on*, optic nerve

The lens in front is a self-adjusting one and so acts that the rays of light from an object may focus upon the retina. The images of objects formed on the back of the eye, the retina, are like those which the photographer sees when he looks in at the back of the camera.

The stimulus to vision is light as it is spoken of in physics. Light is there regarded as consisting of wave movements of the ether with which space is filled. Stout says: "For our purposes we may represent this undulating movement by the waves which pass along a rope when it

is fixed at one end and jerked up and down by the hand at the other. As the wave traverses the rope, what travels along is not, of course, the material particles of the rope themselves, but only a form of movement which is transmitted from one set of particles to another. The hand may move more or less quickly; the more quickly it moves the shorter are the waves."

These differences in vibration rates of the ether waves give rise to the different colors. The red rays at one end of the spectrum are the slowest, making about four hundred forty trillions of vibrations per second, while the most rapid are the violet rays, which make about seven hundred ninety trillions per second. The other spectral colors arise from vibration rates between these two extremes. The brightness sensations are excited by light consisting of waves of ether of every possible length and rate of vibration traveling together, or by combining certain vibration rates together, as seen in the matter of complementary colors, while each color of the spectrum is caused by a series of the same length and rate of vibration.

Theory of color vision. It would not be profitable in an elementary work like this to discuss to any great extent a theory of color vision, or just how the eye works so as to produce in consciousness the various visual sensations. Complete agreement on the subject has not been reached by psychologists, or by physiologists. We may say that in the center of the retina vision is clearest, and all the colors, shades, and brightness qualities are there best seen. Discriminations of the reds and the greens seem to be limited to this central part; a region farther out from the center seems to be still able to notice the blues and the yellows; while farther away yet only the grays are noticeable, and all objects seen in this indirect vision are gray. Just

what the differences are in the processes that go on in the different parts of the retina to produce these differences in power of vision, as well as to account for certain other peculiarities of vision which we have not space to mention, are not yet clearly made out.

Sound sensations. Sound sensations may be divided into two sorts, tones and noises. It is difficult to further classify noises according to quality, though we commonly refer to different sorts of noises, such as crack, crash, snap, puff, and others. Loud and low are, of course, distinctions of intensity and not of quality.

Tones, on the other hand, admit of exact classification; that is, in accordance with their pitch. The pitch of a tone is its quality. Besides the twelve tones within each of the seven octaves of the musical scale, there are very many more which the ear can detect. Each tone may have different degrees of loudness or intensity. Differences in tones of the same pitch when sounded on different instruments are called differences in timbre, and are occasioned by the addition of various overtones to the ground tone. This is sometimes referred to as the quality of a tone, but in psychology it is better to reserve the term "quality" for differences in pitch.

The stimulus for sound sensations is sound as it is spoken of in physics; that is, air waves. These waves may be regular or irregular in their rate of vibration. The regular waves give rise to tones, the irregular to noises. The rate of vibration determines the pitch. The greater the number of vibrations per second, the higher is the pitch. The intensity or loudness of the tone is determined by the breadth or amplitude of the vibrating wave.

The noises which we commonly hear are decidedly complex in quality and it is apparently impossible to single out

all the simple noise elements in these compounds. It is said that over five hundred simple noises may be made out. Not only do these common noises contain many simple noise qualities, they also contain many elements of tone.

It is very difficult, except for the most trained observers with delicate sound discrimination, to single out the simple

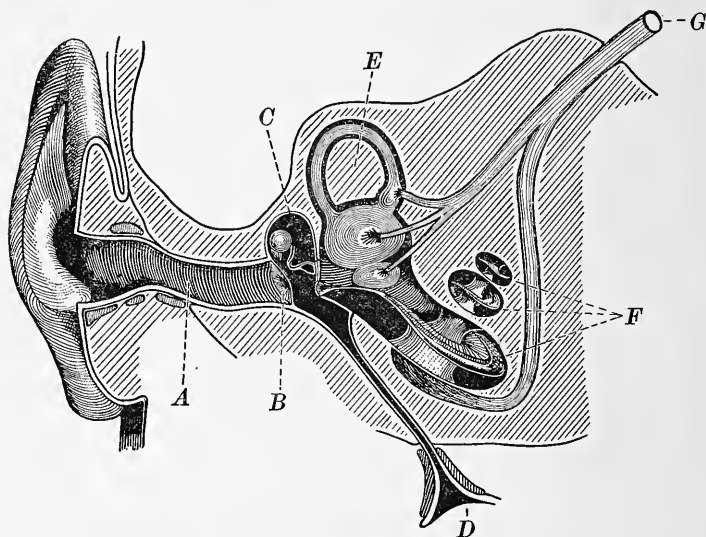


FIG. 13. Diagram of the ear

A, the auditory canal, leading to the tympanic membrane *B*; *C*, cavity of the tympanum, communicating by the Eustachian tube with the pharynx *D*; *E*, semicircular canals; *F*, cochlea; *G*, auditory nerve

tone elements. The overtones mingle with the simple ground tone, and the tones fuse decidedly into clangs. Tones may be heard depending on vibrations of air waves from about sixteen to about fifty thousand per second. Between these two extremes about eleven thousand tones may be noticed as just different from one another.

The theory of sound sensation is not as yet settled beyond question, but the following description from Titchener's "Outline of Psychology" seems to meet best the requirements of the case. "Sound is received into the outer passage of the ear, conveyed inwards by a series of vibrating bodies (elastic membrane, chain of small bones, etc.), and finally produces a movement in the water (endolymph) of the cochlea of the internal ear. The cochlea is a hollow tube, through the whole length of which is stretched a membrane, the basilar membrane. The cross fibers of this membrane are arranged like the strings upon the backboard of a piano; they are very short at the beginning (treble strings) and gradually increase in length as the membrane continues (bass strings). Each cross fiber carries sensitive cells with which the fibrils of the auditory nerve are connected. A movement of the water in the tube excites the cells standing upon particular strings or cross fibers. Only those strings are affected, in a given case, whose vibrations correspond to the sound outside the ear which causes the movement in the water. Each string may thus be said to be tuned to a certain sound wave." For a full discussion of tone and noise sensation, reference may be made to Titchener's treatment in his "Text-book of Psychology," Sections 23 to 28.

Taste sensations. Most of our tastes, for instance the taste of the orange mentioned above, are not simple sensations, but should rather be called perceptions. The taste of the orange is composed of a sweet taste, an acid taste, a scent or fragrance, a coolness, the way it feels in the mouth, etc. There are four simple taste qualities,—sweet, acid, bitter, and salt. These are easily distinguished from one another, while one or more of them will be found in every complex taste which can be experienced. In analyzing any such complex taste, one cannot help noticing how closely

related taste is with both smell and touch, or the way the object feels in the mouth. The fragrance and the way it feels in the mouth have much to do with the so-called taste of the object, as in the case of the orange. It is rather surprising that so much of what we call taste is really smell, or pressure or temperature sensations connected with the mouth. Thus if the nose is held, or if one has a cold, the taste of many very tasty things is decidedly interfered with. A few simple trials are enough to convince one of this.

The stimulus to taste must be in liquid form. Solids have to be dissolved by the saliva before they can be tasted.

The end organs for tasting are the tongue and soft palate, or more particularly little bulbs contained in the papillæ of these organs. These are connected with the gustatory nerve, which conveys the taste stimulations to the brain. Different areas of the tongue, too, seem to be particularly partial to the different simple tastes. Bitter seems to belong chiefly to the back part of the tongue, the tip seems to respond best to the sweet and salt, while the sides seem to be mostly responsible for sour.

Sensations of smell. There is no satisfactory classification of smells according to sensation quality. Our common way of classing them is either into pleasant and unpleasant, or, perhaps even more commonly, according to the object from which they come. These classifications are, of course, sufficient for practical purposes.

The stimulus to smell consists of very minute particles given off by the smellable object and drawn into the nose by breathing or snuffing.

The end organs of smell are in the upper part of the nose cavity, and are minute nervous structures in the mucous membrane there, the sensitive patch in each nostril not being larger in size than one's little finger nail.

Temperature sensations. Temperature sensations are, as our common language indicates, of two sorts, cold and warmth. Each may, of course, differ greatly in degree of intensity. When the skin is stimulated by anything warmer than itself, we get sensations of warmth, and by anything colder, sensations of cold. Usually any moderate stimulus above 34° C. (the normal temperature of the skin) will be sensed as warmth, any stimulus below that as cold. The experience of heat is probably not a simple cutaneous sensation, but a combination of warmth, cold, and, in most cases, pain.

Experiments have revealed a very interesting fact about the end organs for temperature. There are warmth spots sensitive to warmth alone, and cold spots sensitive to cold alone, located close together in the skin all over our bodies. These can be located by experiment and are the real sense organs for temperature.

Sensations of touch or pressure. These sensations are those of how it feels to touch or to be touched. We cannot classify them into qualities, for they have but one quality, and that is pressure. Simple touch, that is contact, and hardness and softness, sharpness and bluntness, active touch, etc., are only varieties of pressure, mingled perhaps with other sensations.

The stimulus is mechanical pressure or contact with the skin. The end organs, like those of temperature, are spots located more or less closely together in the skin all over the body. Under each pressure spot is a tiny nerve-fibril ending as is the case under the temperature spots, but different in form. When the skin is touched upon these pressure spots, there is a clear, distinct pressure sensation. When it is touched between these sensitive pressure spots, the sensation is dull and is due to the spread of the stimulus to these sensitive spots.

Certain parts of the body, the lips, the tips of the fingers, and the forehead, are much more sensitive to pressure than those at the other extreme, the back, the arm, and the sole of the foot.

Pain sensations. The temperature sensations and the pressure sensations just referred to make up, with the pain sensations of which we shall now speak, the cutaneous or skin sensations. Pain sensations arise from stimulation (a needle-point will do) of certain minute areas very numerous in the skin. Pricking or cutting will quickly give rise to these sensations. Pain sensations are usually unpleasant or painful, but in mild forms of stimulation this is not necessarily the case.

Muscular sensations. It is difficult to isolate muscular sensations so as to be conscious of them by themselves. Whenever there is a muscular movement, however, in any part of the body, these sensations come more or less into consciousness. They are much like pressure sensations in quality, and practically cannot be distinguished from them. The end organs for these sensations are the striped muscles all over the body, and the proper stimulus is sufficient movement in the muscle to affect the little nerve-fibril endings with which the muscles are well supplied.

Articular sensations. Movements of the joints give rise to sensations which, like the muscular sensations, are little noticed, difficult to isolate, and are of a quality like that of pressure. Both muscular and articular sensations are used somewhat, as we shall see later, in building up our ideas of movement, position, etc.

Tendinous sensations. When the tendons are tightened, the sensitive nerve fibrils are more or less affected, and the stimulus is reported in consciousness as sensations of strain. These sensations, while not experienced by themselves,

are really quite familiar. While we ordinarily give little attention to them, they are of considerable importance in building up our notions of spatial extent. If the fist is doubled up tightly, or if a heavy weight is lifted, or if almost any form of strenuous exercise is indulged in, the strain sensations may be distinguished in the general feeling of the performance. In ordinary experiences these sensations from the muscles, joints, and tendons are more or less fused together, and are experienced along with skin pressure and often pain. The muscular, articular, and tendinous sensations are often grouped together and called the *kinæsthetic* sensations; that is, sensations resulting from movement.

These various sensations, so many in number, differing in kind and in intensity, form the raw material, or a large part of it, of our conscious life. As was mentioned above there are certain sensations, in addition to the ones described, which ought to be included in any full account of sensation. These are termed *organic* sensations. Hunger, thirst, and nausea, connected with the alimentary canal, and certain sensations from the semicircular canals of the inner ear, are examples of these. But it is thought that all of any great importance for the development of our perceptions and ideas of objects have been sufficiently, if very briefly, described.

We have now discussed the general nature of sensation, and, in connection with the various classes of sensations, have spoken somewhat of the end organs of sense, the adequate or appropriate stimulations for each of the sense organs, and of the resulting sensations or sense qualities. The greater part of our discussion has been upon the kinds or qualities of sensations in each of the classes. We have said, however, that sensations have other attributes besides

the attribute of quality ; namely, intensity, duration, clearness, and in some cases extent.

Sensation intensity. The intensity of sensation depends in great measure upon the strength or intensity of the stimulation of the end organ. There may be, however, slight stimulations of the sense organ without any strength of sensation resulting at all ; that is, without any report in consciousness. The sound may not be loud enough to be heard. At the other end of the scale of intensity — as, for example, when hearing a painfully loud noise or seeing a painfully bright light — there might be a great addition to the strength of the stimulus without the noise seeming any louder or the light brighter. In either case the sensation seems to be as intense as the sense organ, the ear or the eye, can report to consciousness.

With respect to sensations of moderate intensity there is a fairly well-established law in regard to the relation between strength of stimulation and intensity of sensation. If a lighted candle is brought into a room which is getting dark, the effect is quite noticeable. If brought into a room already aflood with light, the light does not seem brighter, though the candlelight has been added. There is the same addition of stimulus in each case, but there is not the same increase in brightness. Take a weight of one ounce in the hand ; add another to it : the weight or pressure sensation is greater than that of the one ounce. Supposing there was a two-pound weight in the hand, would the addition of an ounce weight really seem to add to the weight or pressure ? No, it would not be noticed. And yet there has been in the two cases the same addition of stimulus, but not attended with the same increase of sensation intensity. Increase of sensation intensity, then, does not always go along with increase of strength of stimulus.

Careful experimentation along these lines has resulted, as we have said, in the establishment of a certain law of relationship between increase of intensity of sensation and increase of strength of stimulus. This is called Weber's Law, and may be stated in this way. In order that there may be a regular increase of intensities of sensations, the increase in the strength of the stimulations must bear a constant relation to the strength of the stimulus itself. Thus in the case of the weights resulting in intensity of the pressure sensations, a weight of twenty-one ounces would seem just heavier than a weight of twenty ounces ; but it would take a weight of forty-two ounces to seem greater than a weight of forty ounces. In either case it would be an increase of one twentieth. This is the regular fractional increase of strength of stimulus necessary in the case of pressure sensations in order that differences in intensities of these sensations may be noticed. The fraction differs in the different sense departments. In the case of noises, the fractional increase must be one third ; but the principle is the same, although it should be said that the law and its fractional expression have not, as yet, been fully worked out in all sense departments. For brightness the fraction is one one-hundredth.

That our statement, "The intensity of sensations depends upon the strength or intensity of the stimulations of the sense organs," must be qualified, is, then, very apparent. First, consciousness does not respond at all to many very slight intensities of stimulations ; second, when stimulation intensities are very great, the sensation does not increase in intensity, the limit being reached ; third, the principle involved in Weber's Law must be taken into account throughout the range of moderate sensation intensities. The reasons for these three qualifications are, undoubtedly,

physiological, and it would not be profitable to discuss them here. Nor need we discuss here the further modifying influence of expectation and of variations of the attention; this will be spoken of later.

Other sensation attributes. Duration, clearness, and extent, as attributes of sensation, have been referred to. The two former apply to all sensations, the latter to sensations of brightness, color, and pressure. The sensation may be of longer or shorter duration. It may occupy a clear and distinct place in consciousness, or it may be rather vague. The brightness or color may be small or spread out. The pressure may be widespread or the reverse. In early life, and merely as sensation experiences having duration and extent, they are not definitely temporal and spatial. It requires considerable development of the child's mind, and considerable refining and building up of sensation material into perceptions and ideas, before there is any definite consciousness of "how long" and "how large," that is of our ordinary notions of duration and succession, and of size and distance. These vague duration and extent features of early immature sense experience make possible, it seems, our more developed and more definite ideas concerning space and time.

We have spoken as if each of the attributes of sensation were independent of one another. This is not true, strictly speaking, but nearly enough true for the practical purposes of an elementary text. In more advanced work in psychology one would need to examine carefully the modifying effects produced on each of these attributes by change in the others.

Functions of sensation. Reference has already been made to the main function or use of sensations in the conscious life of the organism, namely, to furnish the material to be

developed into perceptions and ideas for the guidance of the organism in making superior adjustments to the conditions of its life, conditions physical, social, and spiritual. There is, of course, another use to which sensations seem to be put. Certain actions of what might be called a low grade are performed in direct response to stimuli which are attended by sensations. To act just as the sensation or impulse prompts, without regard to anything else, would describe the case referred to. Some of these are under one's control, others are not. Sneezing cannot always be checked, but hunger, thirst, warmth, cold, pain, etc. may lead directly to action to satisfy the physical organism, though they usually are subject to appropriate prudential, social, and moral restraint.

Practical applications. We shall reserve for the next chapter our discussion of the matter of the practical and educational aspects of the use of the senses in sense-perception, observation, etc. Here, however, attention should be called to the importance of so carefully treating the organs of sense that they may be able to do their best work. Exact and definite ideas can only be obtained through exact sense impressions. The eyes, the ears, and other sense organs must be in good working order physically, or they cannot furnish the mind with proper material to work with. Their usefulness as sense organs will depend largely upon their condition, and on regular thoroughgoing exercise of them in their work. Many people, old and young, do not see or hear correctly, just because, as pieces of mechanism, their eyes or ears do not work properly, either from inherent defects, which can quite likely be remedied, or from mechanical defects in the home, schoolroom, shop, or office.

Every care should be taken that the eyes, ears, and all responsive organs of sense shall be able to respond in a

delicate, sensitive, and exact way to all features of environment as given in stimulation, in order that accurate and abundant material may be at hand for the building up of knowledge. Every care should also be taken that much use and exercise be given the sense organs in their work, in order to get much exact material for ideas and in order that they may work more sensitively and exactly all the while.

REFERENCES

- TITCHENER. An Outline of Psychology, Chapters II, III, and IV.
WITMER. Analytical Psychology, Chapters V, VI, and VII.
ANGELL. Psychology, Chapter V.
JUDD. Psychology, Chapter V.

CHAPTER VI

THE COMPLEX PROCESSES OF SENSE STIMULATION: PERCEPTION

We become more or less directly aware of the objects about us by means of our senses. We see the house, the tree; we hear the piano, the clock striking; we taste foods; we touch various objects; and in all these cases we are aware of, or perceive, the objects concerned. This consciousness or awareness is called perception or sense-perception. And so perception may be defined as the consciousness of physical objects which stimulate or affect the sense organs. It is true that we often use the term "perceive" as equivalent to "understand" or "comprehend," but in psychology the terms "perceive" and "perception" are reserved for this special use of being directly aware by means of our senses of physical objects with which we come into contact.

Much of our conscious life consists of these sense-perceptions. As the stream of consciousness flows on in our ordinary experience, we are constantly perceiving objects and having ideas of objects remembered or imagined. Of course perception of an object or of several objects may occupy at any time a larger or smaller place in any state of consciousness. If one were looking at a new fountain pen he might have practically nothing else in mind, except perhaps some pleasure in its possession, and some awareness of the other physical objects about him in the fringe of his consciousness. The pen at another time, however,

might be but one of many objects in the field of vision, and the mind might be much occupied with memories, feelings, and determinations, as well as with the slight perceptive notice of the pen. Perceptions, memories, and imaginations of objects are all-important in the life of the individual, for they furnish us with knowledge of the world about us and make possible intelligent and useful actions with respect to our environment, as will be explained later in the chapter.

We have just spoken of perception of objects, and also of memories and imaginations of those objects. Without trying to notice the differences between memory and imagination of objects, it will be well to point out some distinctions between these mental states on the one hand and perceptions on the other. The great difference is that in perception the object is directly presented to the senses, while in memory and imagination this would, of course, not be the case. Another difference, and apparently a consequence of the first, is that the perception is regularly more distinct and vivid than an idea, memory, or imagination of the object. In spite of these differences we shall soon have occasion to see that, in structure, perception and ideas or memories of objects are decidedly more alike than they are different.

Perception compared with sensation. We must next inquire how perception as a process in consciousness differs from sensation. First, a perception is always a perception of something. It has a constant reference to some object. It stands in consciousness for the object. Sensation, on the other hand, simply exists for itself in consciousness, is in this way subjective, and does not stand sponsor for some object in the outer world. We notice the sensation just for itself, the perception as the revealer of an object. Second,

the sensation is a simple elemental process. It cannot be analyzed into anything else. Is this the case with the perception? We have already practically answered this question in connection with our treatment of sensation. Perception, as we experience it, seems like a single pulse of consciousness, a unit, and in one sense this is true. To hear the clock striking, to see the house across the street, — neither is, apparently, a complex mental experience, but a simple one; yet the moment one begins to analyze the idea or perception of the object, it falls apart readily enough into the various features, corresponding to the qualities of the object concerned. The attention now dwells on this feature, now on that; and each feature, simple in itself, seems to belong to the whole idea or perception of the object. As was pointed out at the beginning of the last chapter, the idea or perception of the orange was complex rather than simple. In its constant reference to some outer thing or object, and in its being really complex rather than simple and elemental in consciousness, the perception differs from the mere sensation.

Analysis of perception. If the perception is complex in its nature, it will be well to ask of what it is made up. The orange may be perceived by simply looking at it; so the desk. What do we get by means of direct sensation in these cases? Visual sensations of colors and shades. The color and shading of the desk or orange, however, are but a small part of the whole perception. There is the taste of the orange, its odor, the way it feels to the hand, etc. There is the smoothness of the desk, its hardness, its coolness, its uses, etc. Where do these features come from in my present perception of these two objects? From memory, of course, of former sensation experiences in connection with these objects. These features of the objects which do

not now come directly through the eyes are so firmly associated with the sight sensations which I now do get directly from the orange or desk that they are just as real to me as the colors and shadings, and just as really form parts of the perceptions. We have, then, already, two sets of factors entering into the make-up of the perception; namely, the sensations which I now get from actually seeing (or hearing, or touching, tasting, etc., as the case may be) the objects, and the sensations which I remember in connection with these actually present sensations.

Is there any further factor or set of factors besides the present sensations and the memory images which go to make up the perception? Yes, one very prominent set of features; namely, the location or position of the thing, its size and shape, and its movement. These we may sum up under the head of the space properties of all objects. These features are not directly obtained from any present or remembered sensation, — as are color, taste, hardness, sound, etc., — and yet are quite as conspicuously parts of the perception. The perception is made up, then, of (1) present sensations, (2) memory images of former sense experiences, and (3) the space properties of the objects perceived.

Problems of perception. The problem of perception, then, becomes, How is this combination of present sensations and memory images of former sense experiences into a perception of a thing, an individual, external thing, brought about? and further, How is it that the object perceived comes to have all the spatial properties as well? It will be well to take up these two parts of the problem separately, though in the actual experience of the growing child both processes are going on at the same time.

Conditions of perception. Before attempting the solution of this double problem of perception, it will be well to take

note of some general conditions of the perception process, though these can be fully described only in connection with the description of the perception process itself.

First, *the physiological conditions*. As we have seen in Chapter IV, the child is all the while impulsively and instinctively active. All the bodily organs are in constant use, resulting in a knowledge of the organs themselves and of the things with which these organs may come in contact. They are in constant use, too, in adjusting the body to its environment and in adjusting the environment for the use of the child. These sense organs are thus active, and are in active coöperation in getting control of the bodily members and the environment. The nervous system, too, is in action in connection with this sense stimulation and motor reaction. The various nerve centers act in unison and must have a structural connection in order that this coöperation in action may be carried on. That is to say, when acquaintance with an object, for instance an apple, is being formed, the nerve centers in the brain concerned with sight, with touch, with taste, with smell, etc., and also the motor centers for handling, tasting, and looking at the apple, are being exercised at practically the same time. This series of brain cells thereby gets into a habit of acting together, so that when, at a later state of development, a certain color means a perception of apple to the child, as it does to us, the stimulation of the brain-cell group for sight leads by brain habit to the immediate stimulation of the other brain-cell groups concerned. Thus physiologically the basis of the perception is a kind of brain habit, and the centers concerned act as a unit. The physiological conditions of perception, then, are (1) the activity of the members of the body, (2) the receptiveness of the sense organs in being affected by stimulations from without, so that all these

organs may act together, and (3) the formation of a brain habit, or the establishing of a functional connection, by means of association tracts, between the various brain centers concerned.

The second general condition is *the activity of the attention*. Each sense experience, or group of sensations, comes to be noticed, to claim the attention. In this way different sensations or sensation groups are distinguished, compared, contrasted. The various sensations experienced are made prominent, so that intelligent use can be made of them. The development of sensations, as sensations, and that of perception, go hand in hand. That amount of attention will be given in each case which the interests and needs of the organism call for. The result is a very "knowing" kind of an experience with respect to the material furnished by the senses. This material may be said to be thoroughly worked over in the way of differentiation and comparison.

But, as already indicated in Chapter V, and as will be more fully explained in Chapter VIII, not only does the attention work by analysis and discrimination, giving us in this case the distinguishable sensation elements, but it also works by way of synthesis, or grouping and welding together any sense impressions which are experienced at the same time. This is made possible by the physiological conditions mentioned above. This second aspect of the work of attention — the associating and fusing together of the various sensations concerned, which is a constant tendency of consciousness — is what makes possible on the conscious side the having of perceptions.

The third general condition is the fact of *memory*. Each of the sensation experiences is more or less well remembered, so that the developing child profits in habits and in knowledge by his experiences. The attention is given to these

memory images as well as to present sense experiences. They, too, are worked over, distinguished, compared, associated, and fused.

Habit, interest, and expectation are all of great importance in determining the nature of our perceptions, and may be grouped together as the fourth general condition of the perception process. We tend to perceive that which we are interested in. What we are expecting to see is likely to influence our sight perception. What we are in the habit of noticing under certain circumstances will decidedly prejudice our notions of what we do perceive. How this set of influences works to influence our perceptions will be brought out later in the chapter.

These four general conditions of the perception process in its growth and in its use, it will be well to keep in mind, and their place and importance will be more apparent as we go on. With these things in mind, let us next take up the two main features of the problem of perception: (1) how the various sensations and sense images come to be combined into a perception of a thing and its properties, and (2) how those properties of objects which we call spatial (location, size, shape, etc.) grow up in consciousness.

The thing and its properties. The activities of the child in connection with handling, seeing, and tasting objects, result in his consciousness in a complex of sensations. These are noticed, attended to, and remembered as their importance for his instincts and feelings warrants. The fact that they are experienced together tends to their fusion. Little by little the various features of the sensation complexes become noticed for their own sakes. In so far as they are of interest and claim the attention will they be remembered, and in so far as they are experienced together in an interested way will they tend to fuse together and become a

unit in the child's mind. The different parts of the experiences come to belong together; each will suggest at least some of the others, so that when, for example, the sight of the food is experienced, the taste will be suggested. The object that is handled may also be seen and perhaps tasted. These different parts of the sensation complexes come to be so closely allied that one of them, if now experienced, will suggest the rest. Hence the formation of the perception of the unit thing. The whole experience comes to be a perception of the thing, and each sensation comes to be a part of the perception of the thing, or a quality of it. The taste sensation becomes the taste of the thing, and so with the touch, the color, the smell, the sound it makes, etc. Each is a part of the experience now unified into the thing. The process is helped on by a name being given, whereupon the name becomes, in a way, another quality, or mark, or handle of the thing. It is thus seen that a perception is a real achievement on the part of the developing mind, and not something presented to it as a whole from without.

In this process we see the working of the physiological conditions as cited above, the organs working together under the control of the nervous system. We notice also the activity of the attention going along with the interests and needs of the child. The memory, too, is in active use in calling up features not now given in direct sensation. The fusion or association of the various parts of the sensation complex is going on in a very thorough way. The interests of the child determine largely what parts of the experience will be noticed, remembered, and associated; in other words, what qualities the thing will have for him.

Space perception. We are now in a position to explain how the second part of the process goes on, how those properties of the thing which we call spatial grow up in

consciousness. It must be remembered, however, that the two processes are going on at the same time, and that we are separating the two parts here for the sake of convenience in the telling.

The properties of the objects about us, other than the spatial ones, that is, taste, color, sound, weight, smell, etc., are given so directly in sensation that the process of getting them together as qualities of objects seems a very simple one. But when we come to the location and shape of the object, the case is different. We seem now to obtain these qualities directly by touch and sight. A little reflection will show, however, that these are not direct sensations, like color or taste. They must have grown up out of some other sensations which have required a great deal of working over and translating in order that we may now get, more or less directly, the spatial properties of objects along with the rest. The problem then becomes a double one: Out of what simple sensation complexes have our spatial notions grown, and by what means have we been able to work them up and translate them in order that we may get, seemingly directly through eyes and by touch, the spatial properties of objects?

These spatial properties we may take up as location, size and shape, and movement. First, let us discover out of what sensation complexes have our notions of location come, — location on our own bodies, location on surfaces outside of us, and location away from us, or distance.

Location. The active child with moving hands and feet is ever exploring his body as well as other things. In so far as this is reported in consciousness, we have (1) a series of sensation complexes of the cutaneous sort, the touching and the being touched, differing somewhat as the various parts of the body are explored; (2) sensations resulting

from the various movements, sensations of the muscular, articular, and tendinous sort, differing in degree of intensity. The eyes ever follow the explorations, and there will be obtained as the different parts of the body are explored (3) somewhat different visual images, colors, and brightness sensations. The words naming the parts come, after a while, to stand in the mind for the touch, movement, and sight experiences. These three sets of sensation complexes seem to be the original sensation material out of which, with the help of the names, we obtain our notions of location on the body. They are called the "local signs" of position on the surface of the body. As these sensation complexes or local signs are experienced, now one sort, now another, they are attended to, their differences come to be somewhat noticed, they are repeated time and time again, they are remembered, compared, contrasted. They thus come to have significance as means of location, or are real local signs. Gradually they come to be translated by the attentive, discriminating mind into this feature of the spatial notion which we call "location on the surface of the body." So well is this translation carried on that when, now, a certain part of the body is affected, we know where it is and can definitely locate it. A little observation, however, will show that this matter of location on the body is not exact, and that it is more definite at some parts of the body than it is at others. Experiments have been performed to show the average amount of inexactness at the different parts. We may say that the ability to locate exactly impressions on the various parts of the body is as great as the life necessities of the species and the individual have called for.

At the same time that this bodily location is going on, there are growing up notions of location upon an extended

surface outside us. The hands are exploring and the eyes are wide open and moving too. As the hands move over extended surfaces, a series of touch sensations and one of kinæsthetic sensations are experienced, and, what is now even more important, visual sensations are very prominent. The surface presents colors to the eye, different in different parts, making a sort of series of color sensations. Along with these will be the muscular and strain sensations resulting from the movement of the eyes. All these sensations — cutaneous, visual, and those resulting from movement of hands and of eyes — make a series, which, when attended to, compared, contrasted, remembered, become adequate local signs for the mind to translate as positions or locations upon an extended surface.

Great differences are noticed in the abilities of different people in determining the length, breadth, and height of objects. The necessities of life call for greater accuracy on the part of some than on that of others. The carpenter, for instance, has the necessity for correct perceptions in such respects, and usually develops the capacity. This accomplishment means that he has come gradually to note carefully certain aspects of the sense impressions obtained from the objects to which the unpracticed observer pays little attention. Pupils in school who use rulers and who have manual-training work, develop this capacity better than those who do not. These facts go to bear out the truth that this matter of locating on an extended surface and judging of length on such a surface is a gradual acquirement on the part of the developing mind, and not, to begin with, a matter of direct intuition.

With respect to locating things at a distance, or in the third dimension, we may say that again visual, tactual, and movement sensations are in use. The learning of

amount of distance from us is, primarily, largely in terms of movement and strain. The greater the movement and strain, the farther away is the thing, such seems the natural interpretation. As the development goes on, however, visual sensations become more important. We locate things as a certain distance away from us, largely by eyesight, and do it more or less accurately according to our individual experiences. These sensation complexes which serve us as local signs of distance have not been thoroughly made out. It is probable, however, that two sorts of sensation experiences serve largely as these local signs; first, the slight differences between the sense images as obtained by the two eyes, and second, the differences in strain, etc., in the matter of the convergence of the eyes in locating objects as near or as far away.

That locating at a distance, or perceiving how far away objects are from us, is a matter developed in experience, is shown by the way people differ in this respect. At the sea-shore the boat which the sailor will see to be perhaps three miles away may be thought by the summer visitor to be less than a mile. Objects intervening between the observer and the distant point will influence the notion of distance. An unusually clear atmosphere will make things seem nearer, a hazy day will make them seem farther away. A view of the ground between, when objects are noticed at intervals along the way, is often relied on for a correct perception of the distance. Practice tends to make this perception more nearly perfect, and those who are called on by their occupations to make use of such knowledge are usually more accurate than others.

Size and shape. Next in order comes the discussion of the perception of objects as to their size or extent and form. This part of the perception is carried on at the same time

that the thing is becoming located for us, and largely by the same set of local signs. In the use of these local signs, one feature is of especial importance. From the first, visual sensations and those of pressure have the attribute, in a vague way, of extent. The extent of pressure sensations, of colors and shades, the following of boundary lines by hands and eyes, come gradually to mean form and extent. The sudden changes in the sensation complex, when eyes and hands are going around corners, heighten the impression and call attention to themselves. Another prominent feature in our sensation complexes in obtaining our notion of form in the third dimension is the matter of shading, or shadows, on the objects. This local sign is so quickly interpreted as depth that little attention is called to it on its own account. It becomes prominent, however, when in drawing we wish to give the impression of solidity, which is done largely by the aid of shading. Perception of the extent and form of objects is but an interpretation of certain local signs or sensation complexes, and is worked out by the mind in much the same way as perception of location and position.

Extent of movement. The third feature of space perception, that of extent of movement, grows up in the mind along with the other two. When the notions of position are fairly well made out, and the object is seen or felt in different positions, the first feature of the extent of movement is already at hand. As the hand moves over the body, not only will its location from time to time be fairly evident, but as the different sensations or local signs are aroused, some will remain in consciousness as after-images, after the stimulus, the moving hand, has passed on. The strain and muscular sensations arising from the movement will persist more or less in the same way. The visual

sensations, changing all the while, will persist in memory to even a greater extent than the others. By the help of these after-images and memories of pressure, articular and visual sensations giving us at one and the same time ideas of the object as in the different positions, the notion of movement grows up. The same idea becomes more prominent as attention is called to the muscular and strain sensations in connection with movement of arms, etc., upon other surfaces than those of the body. It becomes still more prominent when there is a quick change of visual sensations, caused by seeing a moving object, and by amount of strain sensations, caused by eyes moving and head turning in following the moving object, as the child instinctively does follow it. These series of sensations, remaining as after-images and as memory images after the stimulus has changed, give the local signs which, when attended to, compared, repeated, and contrasted, produce in the mind the notion of movement and its extent or amount.

We have thus related the various kinds of sensation complexes of eye, skin, muscle, joint, etc., which serve us as local signs for the building up of the various features of our perceptions of objects as spatial, namely, location, size and form, and extent of movement. We have also indicated how the mind gradually works up or translates these local signs into the finished features of our perception. Having done this, it will be easy to see how these spatial features are joined with the other qualities of the objects, making up the total perception. These spatial features are attended to, singled out, and finally associated and fused with the other features, such as color, taste, sound, smell, weight, etc. The spatial features become part and parcel of the thing just as the other features or qualities do, and are as directly perceived.

We may say, then, that the perception is made up of present sensations, memory images of former sensations, and the translations into spatial features of certain present and remembered sensation complexes which serve as local signs. The process of making the perception out of these materials depends, as we have seen, upon the work of the attention in distinguishing, comparing, contrasting, etc., and especially upon the power of association in fusing into a unit the various features.

Habit, interest, and expectation as influencing perception.

We thus see that external objects do not swim bodily into consciousness, and also that our perceptions are not immediate copyings of the outer objects. We are supplied with certain sense impressions from without, and we use these and other material as well in building our perceptions. We have seen how important the process of attention is in this building, and also the power of association. There are certain other features of the behavior of consciousness in this work of construction which call for some further notice. These were mentioned above as the fourth condition or set of conditions of the process of perception in its growth and in its more mature exercise, and are habit, interest, and expectation. As will be seen, these conditions are practically but three phases of one and the same process.

The first one is habit. When we are accustomed to seeing a thing or person in a certain place regularly, we are quite easily lead astray if that place is temporarily taken by some other person or thing, if our attention is not especially called to some features of difference between the new object and the accustomed one. So much is what we see, or think we see, a matter of interpretation of our sense impressions, that in such a case we should confidentially assert that we saw the accustomed thing even when its

place had been taken by the new object. This, of course, would be an illusion, but would seem to us an ordinary perception. The main features of the pseudoperception, as well as of a real perception, are contributed by our minds according to habit. A more careful examination might reveal the mistake. Habit then, we may say, plays an important part in the forming of perceptions, even to the extent sometimes of leading us astray.

In fact perception, based, as we have seen, on the habitual activity of the brain cells concerned as its prime physiological basis, might well be called a mental habit. When in sight of an object the stimuli come to the eye and the brain, and the visual sensations appear in consciousness, it is the habitual, immediate interpretation of these sensations that really makes the perception in consciousness of the hillside, building, tree, person, railroad train, or penholder, or whatever is more or less attentively looked at. The process works so smoothly in most cases that we are not puzzled to make out a meaning to what we see, but perceive the object as quick as a flash. This ease and quickness, really the working of mental habit in the case, should not mislead us into thinking that no mental labor has been undergone beforehand. But past experiences have so developed in our minds by attentive mental effort, that habitual mastery in interpreting impressions has been attained.

Another feature of our mental life which plays a decided part in the formation of perception is interest. Those sense impressions from our environment which interest us insist on notice, while many features lacking in present interest are ignored. These sense impressions are joined in making up our perceptions by those features of our memory images which are of interest, and we thus tend to perceive that in which we are interested. Our fears and desires may thus

lead us to build up certain perceptions which another person might not have in the same environment, and which we might not have at another time. Our feelings may thus mislead us and cause us to perceive falsely. The footfall may not be the footstep of the person we are longing to see, even though we may be sure that we hear that person coming. The slight noise at night may not be, after all, the dreaded burglar, even though we are sure we hear him breaking into the house. But, again, our feelings may be of great assistance to us, and we may, by our very sensitiveness and interest, observe facts which would otherwise not enter into consciousness at all.

Interest not only leads us to notice and perceive certain objects in our environment at the expense of others, but it also leads us to discover new aspects or features of the things in which we have the interest. Our interest makes perception partial, makes certain features of an object or person stand out strongly, and also tends to make us ignore what in these things or people we do not care to see. When interests change, the content of our stream of consciousness as given to us in perception will also change. Perception is thus very dependent on interest.

A third feature is expectation. This is closely allied with the other two we have just mentioned, habit and interest. The mind is ready to see a certain thing or person. The proper grouping of memory images is all ready to receive the sense impressions which would naturally come from the object expected. When the sense impressions do come the object is perceived very quickly. We are so eager, so confident, that some different object may furnish us with certain impressions near enough like the ones expected to have us fail to notice the difference; so that while our expectation may lead us in most cases to perceive very quickly and

accurately the object we expect when it comes, it does for the very same reason sometimes lead us astray, so that we may think we see or hear the object expected when in reality it is another object that is present to our senses.

These three features, — habit, interest, and expectation, — are not to be thought of as in any way separate from the attention, the memory images, and the power of association in building up our perceptions. They are just the ways in which the attention behaves ; they are the conditions of the use of the memory images and of the associating process in the case. The attention is at work all the while, the memory images of past experiences are used as material, the fusing power of association is in exercise, and all of their building work is going on largely under the influence of habit, interest, and expectation.

Perception a mental reaction. The mind perceives, then, what it is prepared to perceive. Present sense impressions tend to call up certain associates with which the new impressions seem, according to our experience, to belong, and we then see what we have the preparation to perceive. In fact, perception might be defined from this point of view as the interpretation of sense impressions by those ideas which have been stored up in the mind as the product of past experience, or, more shortly, the interpretation of present sense impressions by experience. Present impression and experience thus fuse to make the perception. The present impression might be compared to the match which sets off the firecracker or explosive material. The material set off would represent the idea material in the mind accumulated by experience. The impression is the pressing of the button, or the pulling of the lever, while the machinery thus set going would represent the content of the mind. Perceiving is thus a mental reaction, the mind furnishing

in most cases the greater part of the material for the product called "perception," or a "percept."

The nature of illusions. In these last paragraphs we have the further suggestion that, in their make-up, incorrect perceptions, or illusions, are not so very different from valid perceptions. Let us notice a little further the nature of these illusory experiences, in the hope that they, while abnormal, may throw a little light upon the nature of the perception process proper.

Take some simple examples of illusion. First, a very old example of an illusion of touch. Cross two fingers, the

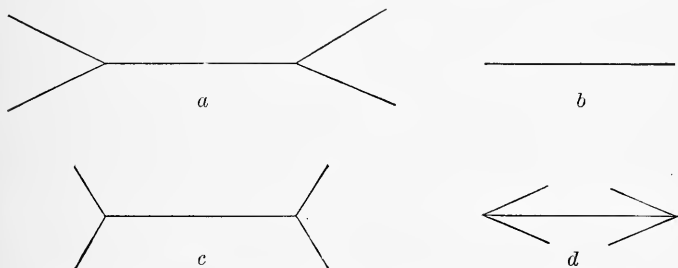


FIG. 14. Perception of length as influenced by surroundings

forefinger and the middle one, and place a small object, say a marble, between them so as to touch both. The object feels to be two. The illusion is easily dispelled by looking. Ordinarily in order to affect the two fingers in this way, two objects would be necessary. Hence the mind in perceiving two objects is simply following out in its construction of the case what would ordinarily be true. Take next a very simple sight illusion in the matter of spatial extent. The four horizontal lines in Fig. 14 are of the same length, and yet ordinary perception of them without measurement would not so decide.

As we know, the length of lines is largely an interpretation of eye movement. In *a* the movement is naturally very greatly extended beyond the line, in *c* somewhat beyond, in *b* not at all, while in *d* there is a decided check or holdback to the eye. The line in *a* is estimated to be longer than that in *c*, *c* than *b*, *b* than *d*. This is, of course, an illusion, but a natural one, resulting from the fact that our perception of length is largely in terms of amount of movement of the eye. Here again the verdict of the mind is untrue, just because it is true to its natural way of interpretation; that is, the greater the movement, the longer the line.

Take the case where some excitable person sees a ghost in a haunted house. Perhaps, on passing the house at night, on account of some reflection there is a flash of light at the window. Instead of realizing what the object, the reflection, really is, the excitable individual with his mind full of the notion of seeing a ghost, and perhaps fearing such an experience, thinks it a ghost. The glint of white is misinterpreted. The feelings are so wrought up, and the expectation so keen, that even such a slight suggestion through the sense organs is enough to complete the perception process, illusory though it is. The greater the excitement and expectation, the more likely the illusion.

Illusion may be defined as a mistaken interpretation of sense impressions. Some object is present, the sense organs are stimulated, but for one reason or another, as already outlined, an illusion results. Such experiences tend to bear out strongly the description of the perceiving process given above, that what the mind itself contributes on account of its experience, is after all a very important, if not the most important, part of every perception, normal or illusory. The perception process, even when it goes astray, is still very obviously acting in the way of normal perceiving; that is,

it is interpreting present sense experience all the while, by associated memory images under the guidance of the attention ; while habit, interest, and expectation are ever present to help mold the product.

There is another class of cases, which seem to the person having them to be perceptions, called hallucinations. These may be called illusions of a very extreme type. Apparently in these cases there is no stimulus coming from the outer world to the senses which should give rise to the false perception. At any rate they are not simply mistakes in interpreting the nature of an object present to the senses. Hallucination may be defined as perceiving objects or persons when there are no objects or persons there to be perceived. It is not simply vivid imagination, as the object is really believed to be present. Such cases seem to indicate an abnormal condition of brain and mind. Under great nervous strain, exhaustion, grief, or terror, sometimes under diseased conditions of sense organs, hallucination may appear. Of course, in dreams and in insanity, they are very frequent. Explanations of such cases must be left to the description of the pathology of the mind.

To explain hallucinations which come to the normal waking mind under unusual circumstances (abnormal mental activity in this sense), two theories have been advanced. The first would make them simply extremely vivid imaginations, so clear and strong that they are mistaken for perceptions. The apparent absence of any object calculated to call them up seems to uphold this theory. The other theory is that there is some stimulus from without in each case, but that it is difficult to trace. The bereaved mother who apparently sees her dead child come into the room, sit down, and talk to her, is in such a nervous condition, and her mind is so filled with grief and memory of the child,

that any slight noise outside the door, in itself unnoticed, might be enough to awaken the vision to the reality of perception. If this theory is correct, and it seems the more probable, these cases of hallucination fit in with the general theory and description of perception and illusion. In all the cases, it is the mind's own interpretation of what is presented to it in sense impressions, be these large in amount or so small as to be ordinarily unnoticed, that makes the believed-in perception.

The function of perception. In the treatment of perception as well as that of sensation the main part of the story is taken up with the nature of these processes from the structural point of view. But their functions are important and should not be lost sight of. The first function of perception is its guidance of conduct by interpreting sense stimulation in terms of past experience. Perceptions are rich and full of meaning as compared with sensations. As interpretations of sense impressions, they are on a high level for knowledge and action. Of course there are higher conscious levels, namely, the ideational processes, such as conception and reasoning (to be later discussed), and the conscious organism relies on them for its more complex adjustments; but a multitude of successful and highly intelligent reactions are made on the perception level. The meaning of sense stimulation in terms of past experiences that can be brought to bear upon the present becomes a guide for profitable action.

The second function of perception is the part it plays in the further development of knowledge. It will be made clear as we proceed that memory, imagination, conception, judgment, and reasoning are developed from perception experiences. Direction of conduct simply on the level of sense stimuli, without reference to the meaning of these

stimuli, was seen to be one of the functions of sensation, but not a function of great value for an organism of such a high grade of mental development as the normal human being. The main function of sensations was seen to be their use in the development of perceptions.

Direction of conduct by reaction to sense stimuli, when those stimuli are enriched in meaning through being related to past experiences, is a very different matter. This function of perception can hardly be called less important than the second function, the providing of material for the further growth of knowledge, even though this knowledge in turn leads to even more refined and more efficient conduct. Both are of the deepest significance for human life and adjustment.

This practically completes the description of the mental process called perception. There are two phases of it, however, which we have not mentioned. These are, first, that the world of objects which we perceive is a world of events, of happenings; in other words, the world which we perceive is in time as well as in space. The duration of events and their succession may be mentioned as our fundamental time notions. The other aspect of perception which we have not discussed is the fact of recognition. We not only see people and things but we very frequently recognize them. Both the time aspects of our awareness of the events of the world, and the fact of frequent recognition, are quite as important in the case of memory as in that of perception, if not more so. It will be more convenient to take them up in connection with our discussion of memory, and the part they play in perception will then be noticed.

The names of many mental processes have, of necessity, been used in dealing with the subject of perception, such as memory, association, interest, and attention. It was

necessary, because, as we have seen, all these are involved in the perception process. We have simply called for the ordinary understanding of these terms, however, in the discussion so far. Later on, they will be discussed more fully on their own account.

Training in perception and observation. As perception is a complex affair, compared with sensation, one would not expect to find its training so very simple. Nor is it. To perceive or observe correctly and to advantage depends on several conditions, and in helping to fulfill these conditions the teacher may be of great assistance to the pupil, while self-help and training depend greatly on their realization.

Importance of trained ability to perceive. To have ability to perceive or observe fully, correctly, and to advantage, is of the utmost importance. In order to succeed in anything, one must know the facts of the case he is dealing with. The artist must notice the individual parts of the landscape, as well as general impressions. Even to play a game well, one must notice carefully and quickly certain actions and suggested intentions of his opponents and of those on his own side, or he cannot act to advantage. The hunter and the fisherman must be wide-awake to all the signs of game; they must know what to look for and must see it quickly and correctly. So the pilot of a boat, the clerk behind the counter, the customer in front of it, anyone, in order to succeed in what he is attempting, must not be blind, but must see, hear, observe, detect the facts, the important facts, carefully and exactly; otherwise his actions will be wide of the mark, not adapted to the conditions confronting him. In other words, he will fail.

Many pupils in school, and people outside of school, have very hazy, inadequate ideas about many things with which they are supposed to be somewhat familiar. They have

heard about these things, read about them, or have seen them hastily and superficially. In order to build up ideas of things that will be true, and so worth a place in one's belief and consideration, it is not enough to get them in this secondhand way; one must see, hear, feel, notice for one's self. How much more the ordinary boy knows about a dog than about an armadillo! The dog he has observed more or less carefully. The armadillo is merely a curious name from geography. Our ideas, our conceptions, must be based upon perceived facts, or they will be either empty or imaginary, useless or untrue. This will be brought out more fully in the chapter where conception is dealt with; but here we may say that not only is perception or observation a useful instrument in getting knowledge, — it is the only way. All the other mental operations, to be of any use, must be based on this one. Hence, for knowledge, as well as for its practical issue in conduct, how important that the mind should be so trained as to perceive the facts! Nor is this ability as common as perhaps one would expect. Perception is too often so hasty, so partial, so misdirected, as to be almost useless for knowledge or efficient conduct. This is not confined to the pupils in school; but if children are ever to become accurate, quick, thorough observers, perceivers of the facts, the exact nature of the things and situations with which they have to deal, the years in school are just the time for these results to be accomplished. How important, then, that this should be one of the chief cares of the conscientious teacher!

Proper adjustment of the sense organs. This feature of the case was referred to in the concluding paragraphs of the preceding chapter. There attention was called to the treatment of the sense organs in order that they might be able to do their best work, and to the necessity of supplying

such material in the environment that the sense organs might have constant opportunity for useful exercise. These conditions must be fulfilled, or the building up of valid and useful perceptions will not be possible. We must not forget that our perceptions are made out of sensations as raw material, and memory images of such sensations. It should be remembered that one great function of perception is the interpretation of the sense stimuli in terms of past experience. The need of the raw material is evident. There must be constant and active use of the sense organs. Eyes, ears, nose, tongue, and hands must be the means of procuring a wealth of sensation material out of which the perceptions may be made. There are other features of the perceiving or observing process which it is all-important to take care of, but they would be of no use were it not for the open eye, the listening ear, the receptive organs of taste and smell, and the exploring hand. Material should be provided in the school and in the life of the young generally, for the exercises of all these organs. The eye is not the only avenue of approach to the mind, nor are indeed the eye and the ear the only ones. These may be, and of course are, the chief ones; but in recent years, in growing measure, the hand has been in exercise in educational work, and in a less degree the organs of taste and smell.

Attention and interest in perception and observation. We have thus far used the terms "perception" and "observation" synonymously. There is, however, a slight difference between them in our ordinary usage, which is suggestive for the teacher; that difference is in the degree of attention. We are said to be more attentive in observing than in merely perceiving. It is perception of the strongly attentive sort, that is, real observation, that the teacher needs to secure in the pupil. The conditions of attention must be

present if the facts are to be noticed by the pupil. The problem of securing observation becomes, then, practically the same as the problem of securing the attention. Genuine interest and attention must be given to the matter in hand, or the facts will not be learned in such a way as to be of use. The bare superficial perception, to which little attention is given, can hardly be said to be a real perception. It certainly does not fulfill the natural function of perception, the interpretation of the sense stimuli. It is merely a temporary impression which has no value for knowledge. It certainly is not observation. And yet in practical school work, and in supposedly educative influences outside the school, so much that is read, so much that is heard, so much that is supposed to appeal strongly to the various sense organs, such as picture illustrations, experiments performed by the teacher, object lessons, etc., is not perceived in such a way as to produce any lasting impression. If attention and interest are lacking, the choicest books, best school apparatus, and richest environment will be of little avail in the matter of furnishing the facts of perception by means of which knowledge can grow. It is the reaction on the part of the pupil that must be obtained, or the perception and observation will lack their vital feature.

Observation depends upon previous knowledge. Earlier in this chapter it was said that we perceive what we are prepared to perceive. We are often told that we bring from an experience what we take to it, or at least that there is a proportion between the two. Underneath these statements is a truth second to none in its importance for the teacher.

There are two main sets of factors in every perception, as we have seen, — the sense impressions, and the memory images which come out, as it were, to meet these sense impressions, and which, with them, make up the perception.

These memory images, or ideas, are always much the greater factor. We do not attend to, notice, have any interest in, or observe, those sense-impression items which do not call out to themselves a group of memory images. No perception of any account, no observation, is made. "To him that hath, shall be given." We are able to notice, perceive, observe, when we have already a body of knowledge or stock of ideas which can seize upon sense impressions and make them mean something for us. We get new ideas with old ones. While we have to use our sense organs with which to observe, it is deeply true that these are only instruments of observation, and that it is with our acquired body of knowledge that we reach out for new ideas and assimilate them. Lack of observation, which teachers deplore, comes chiefly from the fact that the pupils are not prepared for the new material. To be able to know what to look for is all-important.

From this it follows that the attention of the teacher should be given in great measure to understanding what it is that the pupil has to observe with. Not only must the physical conditions be favorable, and the sense organs in good condition; not only may there be a willing disposition on the part of the pupil; but the knowledge and interests of the pupil in the case must be known to the teacher, if his teaching is to be effective and his task simplified. The work of each year, each day, each lesson period, each moment under direct supervision can be so arranged that it will be the natural thing for the pupil to observe and understand it. Of course, this is an ideal condition, but the success of the teacher in calling out genuine observation is in proportion to its realization.

If that which is given the pupil to learn is well adapted to him, if his body of knowledge is well organized and of

the healthy, growing sort, then will observation of new facts be a natural exercise for him. There is much greater need for getting the child ready for the facts than the facts ready for the child. The phrase "power of observation" tends to obscure the real observing process. It is the natural development of the child's life and knowledge that should be sought. If this development goes on in a healthy way, there is no need to invoke a mysterious power of observing. If the conditions as we have described them are met, the matter of observation will take care of itself.

The habit of observing. The pupil may be taught little by little in connection with his actual work that all knowledge worthy of the name must be based on carefully observed facts. The teacher should, directly and indirectly, impress upon the pupil's mind the place and value of perception or observation in the acquiring of knowledge. To observe carefully will then tend to become a conscious aim or ruling ideal. In this sense will the pupil be guided into the habit of looking for these facts in each case as it arises. It would hardly meet the requirements of the case if the school work were so carried on that in a few subjects observing should, as a matter of fact, take place, with the further belief on the part of the teacher that a habit of observation would thus be formed which would thereafter be applied in whatever work was taken up by the pupil. It is apparently essential that the pupil should become conscious of the aim or ideal of procedure and feel its worth in order that it should become a general guide for further work. If this ruling aim is developed in the pupil's mind and its value felt, and if, as a matter of fact, wide observations are made in the different studies taken up, then presumably the good results of the observing process in school work will be achieved.

Whether or not the ideal and habit of observing become well formed in school is not so much a matter of what studies are taken up as of the manner in which the work is conducted. All studies are good observation studies if properly handled. The search for the individual perceivable facts is what is to be encouraged; then the sifting of these facts, the important from the comparatively unimportant, may be safely entered upon. The object of all this is the finding of the general rule, law, or principle, of which the individual facts are the manifestation. When the facts are thus noticed, and the general truth discovered, and when the application of the general truth to individual cases is clearly understood, then the facts may be said to be really known, and the patient perception and observation justified.

Many studies in our schools are too frequently taken up so as to ignore this royal road to knowledge, and thus they fail to cultivate the ideal and habit of observation. If the general truths are simply heard by the pupil as statements, or if so read about in a book, then these truths will be ill understood, not being built by the pupil upon facts carefully observed by himself. The pupil's knowledge is then bookish, as we say; he has not really got it for himself, and he will, in all probability, not be at all skillful in using it in practical life.

We said above that all studies are good observation studies if properly handled. Between different studies, however, there are differences of degree in their practical availability for the purpose. In all our studies of the things around us, all so-called object lessons, and nature studies in the grades, in the natural sciences, physiology, botany, chemistry, etc., it is comparatively easy to get at the individual facts. In this work it seems very natural to first examine the facts, and then from them somehow get the

laws of their happening. Of course the perceiving of the facts, the important facts, is not always easy. The pupils sometimes look at the material at hand with a vacant stare. They are willing enough to see but are not able. It is, however, in connection with such work that the great majority of pupils can be led to see the meaning of observation, to realize its value, to be guided by it, and so to form in this sense an observing habit. But the same observing method should be encouraged in arithmetic, history, geography, and in fact in all the school studies. It is the true way to get at desirable knowledge in these studies, and it is only by keeping up the practice of observing in all lines of work that the right ideal and habit in the case can be formed. This matter will be discussed again, and more at length, in the chapter in which the forming of general concepts is taken up.

The actual obtaining of the facts by wide and careful observation in connection with all subjects studied is of course the main educational aim from the point of view of perception or observation as psychology topics. It is in connection with this actual acquiring of subject matter or content that the subjective or formal aim of developing the ideal and habit of observing is realized. Mental content and mental form go together. The way to learn to observe is to observe. The way to make one's own the ideal and habit of observing is to observe and to realize what one is really doing in observing. The knowledge obtained by observing, and the realization of how it was obtained, become the great means for further observing.

In summing up, then, for the present, it may be said that the teacher should keep constantly in mind: (1) the great importance of wide and thorough observation and of trained ability to perceive; (2) that for proper perception

the sense organs must be in good working order, and the material to be perceived must be easily available ; (3) that it is only by securing, in all the ways possible, the attention and interest of the pupils that any observation worthy of the name can be carried on ; (4) that, most important of all, observation depends upon the previous knowledge of the pupil, what he will see depending on what he is able to look for and find ; (5) that the ideal and habit of observation can be formed gradually by encouraging the practice of observing all the while in connection with all school studies.

REFERENCES

- WITMER. Analytical Psychology, Chapters I and IV.
THORNDIKE. Elements of Psychology, Section VIII.
JUDD. Psychology, Chapter VI.
ANGELL. Psychology, Chapter VI.
LADD. Outlines of Descriptive Psychology, Chapter IX.

CHAPTER VII

THE SIMPLE AFFECTIVE PROCESSES: AFFECTION AND FEELING

In Chapters V and VI the nature of the mental processes, sensation and sense-perception, has been discussed. These are the more primary features of the mental life as a knowing or cognitive affair, sensations being the elemental factors out of which perceptions of the external world seem to be made. The remaining features of our cognitive or knowing experience — memory, imagination, conception, judgment, and reasoning — will be seen to be developed out of the more primary forms, — sensation and sense-perception. Before going on, however, with the account of the higher development of the knowing experience, it will be well to inquire into the nature of the more primary features of another phase of mental experience, namely, that of feeling. In doing so reference will be made to such experiences as memory and thinking, but only in their ordinary use.

The feeling part of mental experience is very important and very prominent. Our lives would be colorless affairs indeed were it not for this life of feeling. Pleasant, unpleasant, interesting, joyful, sad, such are the words we apply to our experiences, and such experiences are full of meaning. We have but to mention such terms as pleasures, emotions, feelings, joys and sorrows, delights and woes, sentiments in connection with the beautiful in nature and art, to have suggested to our minds the decided value for us of these experiences, and the important part they play in our lives.

Affection and its attributes. Perhaps the most noticeable feature of feeling experiences is that which is at once the best description of them, and the most fundamental way of classifying them. This feature is that all feelings are either pleasant or unpleasant, or, in other words, agreeable or disagreeable. To refer to pleasantness and unpleasantness is to point out a distinct feature of our conscious lives. The pleasantness or unpleasantness may be of this experience or of that, it may be of greater or less intensity, it may last a longer or shorter time, but in any case the agreeableness or disagreeableness is there as the unique feature of the experience.

Just as the sensations were referred to as mental elements, in a way making up the cognitive experience, — perception, — so we may speak of the elements of feeling, pleasantness and unpleasantness. As these elements show how we are consciously affected by an experience, they are called affection elements. Affection, then, is a term denoting a process on a level with sensation in the matter of the structure of mental states. It cannot be resolved into anything simpler or more elemental.

There are, then, two sorts or qualities of affection, namely, pleasantness and unpleasantness. This number — two — stands in decided contrast to the vast number of sensation elements. For all that, as we shall see, the life of feeling is in no way a poor or monotonous affair. This is due, of course, to the important part played by these two elements in the great variety of mental experiences.

In addition to this attribute of quality, affection has the further attributes of intensity and duration. Nothing is more apparent about pleasantness and unpleasantness than the fact that feeling experiences are more or less intense in degree of affection. Slightly pleasant, very agreeable,

extremely disagreeable,—these terms indicate different degrees of feeling tone. Whether the pleasantness or the unpleasantness of an experience lasts for a longer or a shorter time is a well marked and important feature of all feeling experiences.

We have noticed, then, that affection is a simple element of mental life, that it has the attributes of quality, intensity, and duration, and that the affection qualities are two in number, namely, pleasantness and unpleasantness.

Sensation and affection. There is, of course, the closest connection between sensations, perceptions, and other cognitive processes on the one hand, and their pleasantness and unpleasantness on the other. It is just these sensations, perceptions, memories, etc., which are pleasant or unpleasant. We speak of a pleasant taste, a sad spectacle, a sweet memory, an interesting line of thought, a delightful journey, and so on.

Sensations, too, are like affection processes in that both are elemental features of the conscious life. It may serve, however, to bring out somewhat the nature of these affection elements if a few points of contrast between them and sensations are shown.

1. It is possible, though indeed very unusual, for a sensation to be attended to and experienced by itself. This could never happen in the case of affection, just because by its very nature pleasantness or unpleasantness must be the pleasantness or unpleasantness of something. It is only theoretically, then, that we can speak of affection as being a mental element, as it cannot be experienced by itself, and is merely the affective toning of a complex mental experience.

2. Sensations are localized by us with reference to the place of the stimulus, for example, colors of objects,

pressures at different parts of the body. Affection, on the other hand, is simply lived, is not referred to any place, but is experienced by the self as a coloring or toning of the whole mental state as a general condition of the soul.

3. Affection is much more personal or subjective than sensation. Pleasantness and unpleasantness seem to be decidedly our private affairs. Of course sensations are just as much parts of one's conscious states as is affection, but colors, smells, tastes, tones, and other sensations are, after all, rather common property under conditions similar to all. They may be lived by all who are present, and, as we have seen, they are used by all to make up perceptions of the external world. The pleasantness of any experience is peculiarly one's own. It may be referred to certain conditions, and a similar affective toning may be in others' minds as well as in one's own, and may in so far be common or objective; but even so it is, in the main, a decidedly subjective affair, a personal experience, having an intimacy with one's self and an exclusiveness which sensations do not possess.

In contrasting affection with sensation, then, it may be said: (1) that while it is possible for sensations to be attended to by themselves, affection cannot be; (2) that we tend to localize sensations with respect to their source, while affection is a more general affair belonging to the whole conscious process at the time; and (3) that there is an intimate, personal, subjective character about pleasantness and unpleasantness, while by contrast sensations are more impersonal, common to all, objective.

Definition. We may now safely attempt a definition of affection. In fact, in explaining the use of the term "affection," a definition was practically given. It was then stated that the feeling features of consciousness, pleasantness and unpleasantness, show how we are consciously affected

by an experience. In the light of the foregoing discussion we may make the following statement: Affection is that elemental part of a state of consciousness which shows how we personally take the reception by the organism of its impressions; or again, affection is the simple feeling tone of any experience. The meaning of these definitions will be brought out further when we consider the physiological basis of pleasantness and unpleasantness.

The various stimuli or impressions which play upon the end organs of the bodily system are recorded in consciousness as sensations in so far as they are especial stimulations of this or that part of the organism. But these impressions are not only noticed and acted on, they are in a way valued, according to their general effect on the organism. This general effect may be beneficial, it may be harmful, or it may be indifferent. By beneficial is meant the preserving and furthering the life of the organism; by harmful, the reverse of this. The individual stimulations are reported in consciousness as the various sensations, but this general harming or benefiting the organism is, as a general thing, reported in consciousness as pleasantness or unpleasantness. Affection seems to be the conscious way in which the whole nervous system responds to the stimulus. Sensation is the report in consciousness of the impression on the sense organ and on certain specific brain areas. When the stimulus is indifferent so far as the welfare of the organism is concerned, no affective report is made or needed. As a general statement, too, it may be added that the degree of pleasantness and unpleasantness is a measure of the benefit or injury received by the organism from its impressions. To these statements, however, many qualifications should be made. Some experiences may be temporarily exhilarating, but attended with undesirable consequences. Habit

has its influence; so illness or any abnormal state of the organism. These qualifications will be taken into account in the discussion in the remainder of the chapter.

Affection, feeling, and affectively toned idea. As was said above, we never experience an affection, that is, a pleasantness or an unpleasantness, by itself. The affective experience as actually lived may be given the familiar name "feeling." Thus any sensation, perception, memory, etc., which is so agreeable or disagreeable that the affective part of the experience seems to be its chief feature, is called a feeling. When the affective part of the experience is of less prominence, we call the mental state an affectively toned sensation, idea, etc. No hard and fast line can be drawn between the two, however, and our further discussion of feeling will apply to the affectively toned experiences as well.

Classification of feelings. The fundamental classification of feelings is, as has already been intimated, into pleasant and unpleasant. While this fundamental classification should be kept in mind, there are other classifications which are of use in understanding the nature of the feeling life. One of these classifications is that into sense feelings and ideational feelings. Sense feelings are sometimes called physical or bodily feelings, or even the lower feelings, though such a term is hardly in place in psychology. Ideational feelings are sometimes called mental or intellectual feelings, or even the higher feelings. These various names and their associations need not lead one astray. Sense feelings are those which are composed largely of sensation processes and strong pleasantness or unpleasantness, and which are the result of stimulation of the sense organs. These feelings may arise in connection with taste, smell, sight, hearing, touch, and the various organic sensations.

They are called physical or bodily feelings on account of their source, but it should be remembered that our experience of them is a part of the stream of consciousness, and in this way they are just as mental as any other experience we may have. It is very seldom that purely sense feelings are experienced. The sensation becomes in most cases complicated and fused with various associations, memories, imaginings, etc., so that the feeling experience becomes quite complex. They may properly be called sense feelings, however, as the actual stimulation of the sense organs concerned is probably most responsible for the deep agreeableness or disagreeableness of the experience.

There is no sharp line of division between the sense feelings and the ideational feelings. Ideational feelings are those composed of idea processes, memories, imaginings, etc., and strong pleasantness or unpleasantness. These ideational feelings may go on in experience without admixture of sensation, but frequently this is not the case. However, they are still properly called ideational feelings when the chief part of that which is deeply pleasant or unpleasant is a flow of ideas in the stream of consciousness. It is difficult, very frequently, to classify those feelings aroused by perceptions of objects. In the mental process at the time there is much of sensation, much of memory and of association, much of suggestion, entering into the perception of the objects. Of course in some of these experiences the senses are mostly appealed to, and in others the intellect. Where this is marked, we are able to make the classification without much difficulty. The division into sense feelings and ideational feelings is not a sharp affair, but must be thought of as roughly marking off two parts of our conscious experience of the feeling sort according to the proportion of sensations or ideas involved.

Another classification may be made into simple feelings and complex ones. We shall reserve for discussion in a later chapter those complex features of the feeling life which are called emotions and sentiments. In this chapter we are dealing principally with the simple feelings. The complex feelings, emotion and sentiment, might, of course, be discussed in this chapter in connection with the distinction between sense feelings and ideational feelings. Very few experiences of the emotion sort, or indeed of the sentiment or higher emotion sort, are purely feelings of either sense or of ideas exclusively, though the emotion we shall find to be made largely of sense material, and the sentiments of ideational feeling.

There is no need for making further classification among the feelings. All feelings are in the first place either pleasant or unpleasant. An experience that is neither pleasant nor unpleasant is not a feeling; nor can any feeling be both pleasant and unpleasant. The conscious way in which we are affected by an experience is either pleasant or unpleasant, or neither. Now, no matter what is the basis of feelings, whether they are sense feelings or ideational, whether they are comparatively simple or complex after the fashion of emotions and sentiments, the pleasantness or the unpleasantness, differing in intensity and in duration, does not differ in quality. The agreeableness or disagreeableness of the ideational feelings — memory, imagination, etc. — is of the same affective, elemental sort as that of the sense feelings, — smelling, tasting, etc. The difference between the experiences is not in their affective quality but in that which is pleasant or unpleasant.

Conditions of affective quality in feeling experiences. The normal life of the organism, mind and body, is an active affair. It receives stimulations, obtains nourishment,

understands its environment more or less well, and reacts upon that environment according to its instinctive, impulsive, and habitual tendencies more or less intelligently. What features of this experience are pleasant and agreeable, and what the reverse? Or, to put the matter in another way, what are the general conditions of pleasantness and the reverse in this process of living?

It is not possible to answer this question with absolute precision, but some general features and conditions may be pointed out. Those activities of mind and body which are the routine, habitual sort have little feeling connected with them. We meet our daily companions, perform our daily tasks, notice in a meager way the customary buildings and landscape, with little of pleasantness or of unpleasantness. Deprive us of any of these things, and the results might be disagreeable. A change might in many instances be agreeable. But in general we may say that the more habitual our daily experiences, the less of feeling life, agreeable or the reverse, there will be. Our attention is somewhat limited and perfunctory, stimulations and responses are dull and commonplace, and, in so far, our consciousness tends to be very neutral with respect to feeling.

Those sense stimulations and those physical activities which are beneficial to the normal, receptive, wide-awake, active organism are, as a rule, pleasant. On the other hand, those experiences which are harmful are usually unpleasant. In the matter of tastes and smells, for example, we like those which are good for us, and dislike those which will injure. Again, closely connected with this, it may be said that stimulations and active exercise which are of moderate intensity are usually agreeable, while excess in stimulation or exercise is both harmful and unpleasant. Lights that are too intense, sounds too loud and shrill, physical

exertion that strains, overindulgence or overdoing of any sort, are both injurious and unpleasant. Of course injuries, cuts, bruises, and unhealthy conditions of the body generally are unpleasant as well as harmful. Another point closely connected with what we have been saying is that undue stimulation of the nerves results in unpleasantness, while stimulation of the nerves in a normal way, and effective, well-adapted nervous and muscular response are, on the whole, agreeable.

It would seem that in our ordinary experience there are exceptions to this general principle of the agreement between the pleasant and the beneficial, the harmful and the unpleasant. The bitter medicine may be unpleasant and still be beneficial. The organism, however, must respond in practically all cases in the way that is usually right. The bitter medicine, in so far as it affects the taste, is of course unpleasant, and the natural result of tasting and eating that kind of food would certainly be harmful. A poor eating practice that would be. But when the beneficial effects of the medicine begin to appear, the normal bodily processes are encouraged, and the result then in consciousness is agreeable. We feel better. This seeming exception thus bears out the general rule: Take another case of the relation of affection to taste sensations. The food may continue to be delicious and very agreeable, even after one has eaten too much. This harmful overeating may be pleasant. A little closer view will, however, show that this exception to the rule is seeming rather than real. To eat that kind of food is generally both agreeable and beneficial. So far the agreeableness is a good guide. Again, when the harm of the overeating begins to be realized it can hardly be said to be pleasant, as many a small boy can testify. The harm and the unpleasantness keep pace, and the

general principle seems to apply even to this case. These two examples, and many others in connection with other forms of sense stimulation which might be cited, go to show that while there is a general, if not universal, coincidence between the harmful and unpleasant on the one side, and the beneficial and pleasant on the other, yet as practical guides the feelings are not altogether to be relied on. The qualification necessary is that the organism must profit by the results of experience and modify the prompting of feeling accordingly. Memory and judgment must be used, or in more forcible, if not more classic language, we must use our heads in such matters if the best results would be achieved. And this is not strange when we consider that this is what brain and ideas seemingly have been developed for.

We may say then that those conditions, stimulations, and activities which are beneficial to the organism; those which are of moderate intensity; healthy, normal conditions of the organism; and moderate and efficient nerve processes, are on the whole agreeable. On the other hand, stimulations and activities which are harmful; those which are excessive; abnormal, diseased conditions, and injuries; and excessive calls upon nerve tissue and ill adaptation of motor response, are decidedly unpleasant.

In connection with the normal, beneficial activities of the organism, which as a rule are pleasant, attention should be called to one feature of this normal, natural life which was spoken of in Chapter IV. There it was pointed out that there are certain instinctive and impulsive tendencies, appetites and desires, which largely determine our life of action. Here we may say that the free exercise and gratification of these tendencies is decidedly agreeable, while the result in consciousness is unpleasant when they are

restrained, balked, or not called into normal exercise. For the greatest amount of satisfaction and agreeableness in connection with these natural tendencies much exercise of thought and will is necessary. Their haphazard and reckless exercise will in many cases exhaust and harm the organism, and result unpleasantly. But they are the normal tendencies of the organism, and proper exercise and gratification is a great source of agreeableness. Interference with them, and inhibition of them, undue and reckless use of them, will be both unpleasant and harmful. Hunger, love, play, sociability, emulation, and all such native tendencies may be thought of here to suggest how much of our feeling experience, both of the pleasant and unpleasant sort, is utterly dependent on the use in life that is made of these instincts and their satisfaction. To the general conditions of pleasantness and unpleasantness summed up in the last paragraph we must add this feature, of being in line with our instinctive tendencies, as decidedly conducive to pleasure, and that of being contrary to these tendencies as productive of unpleasant experience.

With respect to our so-called ideational feelings we may find a general principle which is very like these conditions of sense feelings. Barring our more routine, habitual thoughts and volitions, we find pleasure in our mental processes that work well. It is agreeable to perceive, understand, remember, imagine, and reason quickly, freely, and accurately. To solve our problems correctly, to plan and execute clever and profitable adjustments to situations, to remember exactly how the affair happened, to recognize acquaintances and call them by name, — all these are agreeable in their measure. To have our memories poor and inaccurate, to have the mind a blank when we would imagine, to be unable to recognize and understand the nature of objects

in our environment, to be baffled in the solution of problems, to reason faultily, to be unable to adjust ourselves to new situations and act cleverly therein, — all these are distinctly disagreeable.

With respect to the mental feelings, then, we may say that the free and full, exact and effective flow of ideas in connection with our normal thinking processes is agreeable; while a poor, impeded, and meager process of ideas is unpleasant.

The place of pleasantness and unpleasantness in the so-called higher mental or ideational processes may perhaps best be illustrated by taking the case of memory. What memories are pleasant and what unpleasant? As has already been indicated, when the memory does not seem to work well, when the ideas and the recognition will not come, the result is disagreeable. On the other hand, when the memory works perfectly, the process is in so far satisfactory. But, of course, whether memories are pleasant or not will depend mostly on what they are memories of. Probably in the majority of cases when an experience has been pleasant in first exercise, it will be pleasant when recalled; that is to say, although the old pleasantness does not come up again, the present living it over again in memory is agreeable. This will not be so, however, if our plans, desires, interests, and ideals have undergone much change, so that the memory in question will bring up conduct or circumstances which now we do not think much of, or which we strongly disapprove, or regret, or wish different. That which was once agreeable may now in memory be unpleasant; while on the other hand, many acts and circumstances, unpleasant when experienced, may now in memory be gladly welcomed. According as to whether or not the memory fits in with our present normal mental

processes in the shape of plans, purposes, and interests, will it be welcome or the reverse. The same may be said of our imaginations and our reasonings, and in the next paragraph some reason for this dependence of the feeling tone of the ideational processes on the interests of the individual will be brought out.

It is not only in connection with the sense feelings that instinctive tendencies determine the matter of pleasure and the reverse; purely ideational processes may be in line with these instincts or may be averse to them. These processes may mean as much for the general welfare of the whole life of the organism as sensations and bodily activities. In other words, we have deep-set interests which concern the general life of the individual. Memories, plans (family, individual, or social), imaginings along those lines which are prompted by artistic construction, study and reasoning prompted by the deep-set instinct of curiosity or search for the truth,—all such ideational processes are prompted by our deep-set instincts, and are our interests. This term “interest” is one which will be considerably used in the next chapter, and indeed throughout the whole book. In this connection we may say that it is a term which stands for that condition of mind where there are active mental processes going on freely and fully in connection with the natural tendencies of the organism, mental and physical, and which are more or less agreeably toned. Interest is thus a term which has a decided feeling significance. Its decided agreeableness shows that it is a condition which means much for general mental and organic progress and welfare.

In addition, then, to the conditions of ideational feeling above mentioned, it must be stated that the greatest degree of agreeableness in mental feeling is obtained from the free

and effective flow of ideas, when these ideas are in the service of deep-set instinctive tendencies and desires, that is, of our interests; while the poor, impeded, and meager process is all the more unpleasant when concerned with our interests.

Perhaps we may sum up the most general conditions of pleasantness and unpleasantness, both physical and mental, that is of the whole person, in some such way as this: Whatever makes for the healthy continuance and progress of our whole life, mental and physical, along the lines of its natural development and interests, is, except for the more habitual thoughts and movements, pleasant; whatever interferes with, or retards, this natural healthy continuance and progress is unpleasant.

The practical and educational significance of the life of feeling will be dealt with later in two connections: first, in the next chapter, on attention and interest; and second, at greater length, in the chapter on emotion and sentiment, where some suggestions will be made as to the culture of the feeling life, both as means and as end to be accomplished.

REFERENCES

- TITCHENER. An Outline of Psychology, Chapter V and Section 56.
ROYCE. Outlines of Psychology, Chapter VII.
ANGELL. Psychology, Chapters XIII and XIV.

CHAPTER VIII

THE NATURE OF ATTENTION AND INTEREST

In Chapter II, when describing the general features of consciousness, it was noticed that one of these features, and a very marked one, was the presence in all states of consciousness of varying degrees of attention and interest. It was there pointed out that there are degrees of consciousness, our mental states being more or less intense according to our interest and amount of attention. To repeat a statement then made, "an idea may be right in the focus or light of consciousness, or it may occupy a position away from the focus, until we have no interest in it whatever, pay not the slightest attention to it, and it leaves even the fringe of consciousness and disappears altogether." In later chapters we have constantly used the terms "attention" and "interest," especially in treating of sense-perception. Attention as a topic in psychology is different from such mental processes as perception, memory, etc. We can speak of a perception and a memory, but not of an attention. The word "attention," or "attentiveness," expresses a phase of consciousness which belongs in greater or less degree to all these other mental facts or processes. Each memory, for instance, may be attended to more or less. "Attention" is, then, a name for a general mental activity more or less present in all conscious states. It belongs to no one mental product in particular, but to each one in its turn, when the mind is centered upon any one of the parts of the mental stream. We have already found the

activity of the attention to be one of the most conspicuous and most important features of our mental life; it is now time to inquire more intimately as to its nature and (along with it) the nature of interest.

Some light may be thrown upon the nature of attention and the degrees of consciousness by means of a diagram used by Baldwin in his "Elements of Psychology," page 58.

In the figure the focus of attention where consciousness is most bright and intense is area 5, the bull's-eye. The area next, 4, is consciousness somewhat bright and active, but not so much so as area 5. Area 3 represents a vague, fading consciousness, a condition of inattention, decidedly in the

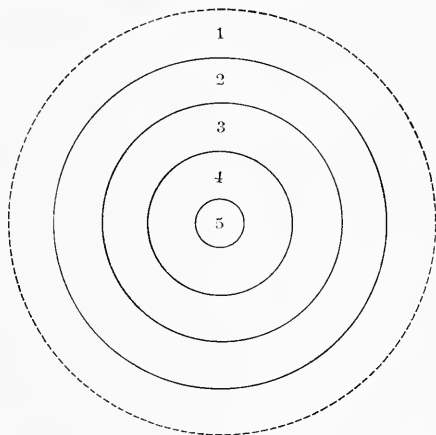


FIG. 15. Diagram illustrating degrees of consciousness

fringe of consciousness. Area 2 represents an entire absence of attention, and includes all so-called subconscious states. Area 1 represents the unconscious, nervous activity of the organism.

I may be thinking of a day's outing. The rowing of the boat may be for the moment the focus of my attention, area 5. The other features of the holiday closely connected with this may be enough in mind to belong to area 4, the beginning of the fringe, however. Vague remembrances and feelings of other outings, or thoughts

half lingering on the work to be left, may occupy area 3, being decidedly in the fringe. There may be a slight sub-conscious irritation, owing to some disappointment or bodily disturbance, area 2. Area 1 is altogether outside my conscious experience, notwithstanding its physical importance. These attempts at illustration may be of help to some in understanding the fact of degrees of consciousness, and of very little help to others; in either case it is time to pass to more formal description.

Degrees of attention. It is a fact of ordinary experience that the attention is of different degrees. I may be attending to something in a very absorbed way, or may give little attention to it. Even the focus of attention at one time and at another may differ in brilliancy. It may be with great effort or it may be with the utmost ease that I become absorbed in a topic. The degree of attention in the two cases may be the same. Here undoubtedly the nerve centers are most active. On other occasions one's best attention may be a comparatively poor affair. When the mind is most active and consciousness most intense and alert, attention is at its height. In truth, these statements are but different ways of speaking of the same fact. Our best attention may differ at different times. At any one time, in any one state of consciousness, there are different degrees of consciousness and attention. These are facts of everyday experience and observation and need no further description to make them better known.

Attention to a conscious state, perception, memory, etc. makes that state clearer and better defined. It is consciousness at its best. The fact of this clearness and definiteness in contrast with the outlying obscure and vague portions of a conscious field, the fringe as it has been called, is the fact of attention. Any mental state thus made up may be

called a state of attention. Whether we think of this condition of affairs as attention, or whether we think of the stream of consciousness as flowing, or the mind as acting, so as to produce this state, in either case we are describing attention, giving in this way a double definition of what in experience is not divisible except in this abstract way.

Varieties of attention. In attempting to classify the forms or varieties of attention we must make a distinction between the result of the act of attention and the ways of getting the attention concentrated. The varieties of attention differ rather in the ways of getting the attention concentrated or focused than in the fact itself of having the attention focused or concentrated.

Keeping this distinction in mind, we may speak of the first variety of attention to which the name "voluntary attention" is given. Voluntary attention is attention with effort. Effort is its distinguishing mark. To attend to a distasteful task when joyous, interesting things are at hand which might be engaged in, requires considerable effort. It is a real strain to keep at work when one wishes to be at something else. The experience of effort arises because of the conflicting claims upon the attention, and is the consciousness of the conflict. And if we ask why one should ever thus exert effort to attend to anything, why undergo the strain, and voluntarily keep one's attention on the hard and perhaps disagreeable things when more alluring things are calling, the answer must be given in terms of adjustment of our lives, thoughts, and actions to life's conditions. The voluntary attention is not given to anything for the sake of that thing itself. We take up the hard, disagreeable task not for its own sake. Attention with effort is given to a thing because of some relation between it and something else which we really want to have, or be,

or do; in other words, something which is of vital concern, interest, and importance for us. We make the effort and undergo the strain because the matter in hand is a means to some further desired result. For some further end or purpose, more or less definitely in view, do we make the effort. This making of effort has always been regarded as one of the most splendid capacities of the human mind. It is certainly not the path of least resistance. It is the mark of strong character. It is found wherever the unique and unmistakable experience called effort is required, and where it is exercised to give the mind wholly to the business in hand. Voluntary attention, then, is a distinct variety of the ways by which the mind is concentrated. Its keyword is *effort*.

Spontaneous attention, the next variety, is that marked by interest rather than effort. It seems comparatively easy, while voluntary attention is difficult. To give one's self up freely to doing the things one loves to do, is spontaneous attention. It is immediately, freely, whole-heartedly given. The object attended to is of intrinsic worth or interest to the person, and the mind goes right out to it, — is absorbed in it. We give ourselves up to the game, or to a hobby, or to an interesting book, or study, or physical exertion, or play, for the sake of the activity itself, and the enjoyment. Its keyword is *interest*.

Another variety of attention may be called forced attention. This is given rather against our will, and we cannot help ourselves. Its keyword is *assault*. Loud sounds, insistent odors, bright lights, or any other unusually strong sensation, which some stimuli from our environment force upon us, may be thought of as illustrating this variety of attention. One cannot help hearing the thunderclap, or seeing the lightning, or feeling the blow.

The attention may then be concentrated by means of effort, the voluntary sort; or by interest in the object, the spontaneous sort; or by having our senses assaulted by a strong stimulus, the forced variety. Voluntary attention is marked by effort of will, while the other two varieties are not so marked and are often called involuntary. Voluntary attention is sometimes called active, and these other two passive, but these terms are rather misleading, for the mind may be even more active, in the sense of being more alert or wide-awake, in attention of the spontaneous variety than in attention with effort. In our further discussions certain distinctions and relations between voluntary and spontaneous attention will be spoken of, while we shall practically neglect to take any further notice of the third variety, as its importance for mental development is slight.

The result of the act of attention, the attention state itself, — the fact of consciousness being focused and our being engrossed in something, — is not really of three kinds, or even two, but one. It is true that the state of mind called attention may contain the strain of effort or the joy of interest, but the clearness and definiteness of the mental state is the important fact after all. This is the state of attention, and this fundamental fact should be remembered even when the different varieties are spoken of and their uses and interrelations made apparent.

The duration or holding of the attention. It is one thing to catch any one's attention, it is another thing to hold it. Attention seems to be ever shifting, now absorbed in one topic, now in another; yet as we know, in order to accomplish any mental work we must keep our attention fixed, our minds concentrated upon the topic under consideration. It will be in order, then, to inquire as to the duration of the attention and the conditions of desirable concentration.

One can read a book, play a game, watch a play, work on a puzzle, and even study Latin or geometry for hours at a time. In this sense one matter can occupy one's attention indefinitely. Yet on closer view in any one of these examples the attention is all the while changing. The matters thus attended to are complex. Each moment there is something new. We have here the paradox that the attention can be held on a topic for an indefinite time, provided it is all the while shifting. To attend continuously to an object there must be a change in the ideas immediately in the focus of consciousness. We here notice the natural behavior of the attention. We attend to any subject just so long as new features are seen in it which can claim our attention. The attention is concentrated not when the mind is fixed for a long time upon one idea (that, as we shall see, is an impossibility), but when new ideas, features, qualities, and occurrences, in connection with the general topic of our thought and attention, all the while appear to take the attention — the bright focus of attention — to themselves.

Experiment has shown that this focusing of consciousness or pulse of attention can last but a few seconds upon one idea. Its duration will differ under different conditions, but in any case it is momentary and then lapses. After a pause the same idea may be attended to again, or its place may be taken by another. This shifting of attention seems to be due to the wearying of the brain cells concerned. To have the attention strongly concentrated on one idea means physically, or as a matter of brain action, intense activity or shifting of nervous tension on the part of certain cortical neurones. These load and discharge, so to speak, and the nervous impulse moves on, or, it may be, momentarily returns.

It frequently happens, when the attention is directed with effort to the consideration of a topic or to performing a piece of work, that the voluntary attention gives way to that of the spontaneous kind. In fact, if the attention is given to such a mental content for a great length of time, it is usually a case of an interest being developed in that which at first called for effort. The constant strain of voluntary attention with great effort is very wearying, there being a constant series of efforts in jerking up the attention to the matter in hand. Voluntary attention is usually necessary in tackling new problems and in setting one's self to old ones as well; but when the new problem or old task is really seen in its true relation to the ends we are trying to accomplish, when the task itself becomes a part of that end, — then there comes an interest in the task itself, conflicting interests disappear from consciousness, we pursue it whole-heartedly, our attention is spontaneously given up to its changing features, and the task is performed, the end realized, the problem perhaps solved. The best working of the mind depends largely upon this ability to attack a task or problem with the attention of the active, voluntary, even strained sort, and then upon the gradual absorption of the mind by its task or problem so that the attention is freely given to the matter in hand.

The problem of an intellectual or practical sort, repulsive or difficult though it may seem at first, frequently discloses features of interest after a time. We find that we like it after all; or we become possessed with the idea that the difficult means is so vitally related to the desired end that we freely and spontaneously give ourselves right up to its performance; or it may be that we feel challenged to complete it, and the performance has all the zest of a game. It quite frequently happens in cases where the voluntary

attention does not become spontaneous toward the matter in hand, that we cease to attend to this thing altogether, and other more interesting things come in to claim the attention, while the difficult or distasteful task or idea gets crowded out of mind.

The reverse process, too, is of frequent occurrence. For one reason or another an interesting or attractive line of thought or piece of work, which at first claims our attention spontaneously, becomes irksome. We become tired, or get enough of it. To keep at it under these circumstances requires effort, and the attention, if given, becomes of the voluntary sort. There must then be some further purpose in view to keep us engaged upon it. If no such purpose appears, the attention is given to something else.

Of course there are cases of attention which are difficult to classify as either voluntary or spontaneous exclusively. Both interest and effort seem to be present in some degree. At the stages when we are passing from one sort of attention to another, we seem to be attending in a measure, both spontaneously and with effort; and in many conditions of thought and action, it would be difficult to tell which is uppermost. Of course the vital thing, both for clear thinking and intelligent action, is the presence of attention, whether it be a clear case of effort, or a clear case of interest, or somewhere between the two.

The range of attention. Can a person attend to more than one thing at a time? This question is frequently asked, and there is no absolute agreement among psychologists as to its answer. The more habitual certain actions become, the greater the number of such actions which can be performed at the same time. It cannot be said, however, that we are attending to them all at once. We do them without giving them our attention. The attention is likely to change

quickly from one object to another, and back again, in trying to attend to more than one thing at a time, so that it seems as though it were given to both at once, though it is not. Again, if more than one thing is presented to the mind at the same time, the tendency is to make the various items in the case into a unit. Thus we attend to the items not as items but as a whole, of which they are the parts. If the items attended to are not of the simplest sort, say two or three lines on the blackboard, it may be safely said that we can attend to but one at a time. It is not clear, however, that we cannot attend to four or five such lines, as separate lines, and to even a greater number of separate tones. Some psychologists hold that this can be done, while others explain it away by saying that either there is a rapid vacillation of the attention, or else the separate items are made into a unitary group. As the most of the things to which we attend are not of this simple nature, and as there is much doubt about our being able to attend to more than one simple impression at a time, the safer principle to work on is that we give our attention in a clear, full way to but one thing at a time.

As we saw, however, in discussing the duration of attention, any separate item of experience to which we attend cannot remain long in consciousness. We may have one general plan, problem, or entertainment before us, and may be said to attend to that hour by hour; but the attention, while occasionally given to the problem as a whole, is all the while making excursions now to this, now to that. Here we might say that the problem is the general object of the attention, while the particular objects of the attention moment by moment will be the various features or aspects of the problem as they present themselves for consideration.

The attention as analysis or discrimination. From the earliest experiences of the child, the mind in attending is picking things to pieces, is noticing the separate items going to make up the whole experience. The attention is given now to this impression, now to that. In this way, as we have already seen, out of first vague impressions of objects come our separate sensations by this analytic or discriminating work of the attention. When we examine anything new to us, — a new flower, or a new machine, — or even when we attend to anything well known, the attention naturally is given to the different parts of the whole, one at a time. This seems to be one of the most important features of the work of attention. It is analyzing, picking out, discriminating all the while. On this, knowledge depends for its development. Without it perception, comparison, and judgment would not be possible. It is one of the main roots of the growth of knowledge.

The attention as synthesis or association. All the while that this analytic activity of the attention is in progress there is going on a synthesis or grouping together of the parts. The parts are noticed not merely for what they are in and of themselves, — for example, the different qualities of the flower or the different parts of the machine, — but they are thought of as belonging together, as related to the whole. This process is constantly going on, as we have seen, in the making of perception, and on this synthetic process all knowledge depends as its other great root of growth. The different impressions obtained from an object are not only noticed singly, but become more or less firmly fused or associated. As was pointed out in discussing the range of attention, the different items of any experience are thought of as parts of the whole experience, and the experience is really made a unit for us by this synthetic,

associative play of the attention. The general mental activity of association is of such far-reaching importance that a chapter will be given to its consideration.

Relation of attention to interest. Interest stands in the closest relation to attention on the one hand, and to pleasurable feeling on the other. To be interested is to attend, and it is to be pleased in the attending. To be interested in anything, work or play, is to be giving one's self up to it; that is, it receives one's spontaneous attention. Real interest is not a listless affair. When one has real interest the mind is intensely active, — engaged in some enterprise of play or work, — and at such times is accomplishing the most it is capable of. When one is spontaneously, wholeheartedly attending to anything, one is interested in it. Interest may be said to be the feeling that goes along with the spontaneous activity of attention; or better, the whole process, the attention together with the ideas and feelings concerned, is one's interest.

Interest and voluntary attention. We have spoken of interest as going along with spontaneous attention. Its connection with voluntary attention is not so direct. It is none the less real, however. Upon our interests our voluntary attention depends. James says, "We never make an effort to attend to an object except for the sake of some remote interest which the effort will serve." We voluntarily attend to the difficult and perhaps distasteful task if it is a means to some end in which we have an interest. The interest in the end is brought back to the means, and the once uninteresting means either becomes interesting in itself or it has for us a borrowed interest.

Genuine interest and pseudo-interest. It frequently happens that tasks, in and of themselves uninteresting, are said to be made interesting. There are two ways of doing

this, a true way and a way of doubtful value. The latter way is the way of sugar coating. The individual, perhaps a pupil in school, is enticed by some hope of reward or fear of punishment, or excited by some story which has no real connection with the matter in hand. In such a case the interest is at first, and usually remains, in the sugar coating, and no real attention is given or interest taken in the matter which it was sought to have learned or done. The sugar coatings, the plausible coaxings, may amuse and please, but the interest is superficial. To interest is not the same as to please or amuse.

The true way of making a seemingly uninteresting problem or task interesting is to show its relation of dependence, as means to an end, to something which calls forth the spontaneous attention; or to present features of the case which may awaken an interest for themselves. This may be more difficult than the way of sugar coating, but the interest awakened will be genuine interest in the thing itself and in its results, and will be more likely to be permanent.

Interest and feeling. To be interested is not merely to be pleased. While interest has its feeling side, and while it is even closely related to emotion, as we shall see in Chapter XIII, its active side must not be lost sight of. We are active when genuinely interested, not passive. We delight in the work or the game, and take our interest in specific objective things. It is not a case of passive feeling, with little regard to its source. Those who think interest to be of little value as an effective mental performance are likely to lay the stress on the "feeling" side of the case, even regarding interest as something of the amusing, passive sort. The feeling in the case of interest is the feeling of activity of the mind, engaged in enterprises of a work or play sort.

When the mind is at rest, is passive, the interest is gone. The interest is in the active quest of the mind, and always has reference to that of which the mind is in quest for its satisfaction. This feeling, however, is decidedly of the agreeable sort, as was noticed in the last chapter, in so far as the quest is being carried on successfully and the flow of ideas is free and effective. The agreeableness departs when the progress becomes poor and impeded, and then even a decided unpleasantness may ensue.

Attention and interest are thus present, more or less, in all conscious states. They are the conditions and the indexes of the richest, most alert mental experience, leading to fuller knowledge and to better adaptations to one's environment. They mark conscious states at their best, and are in greatest evidence where the subtlest processes of learning and of adjustment to environment — physical, intellectual, social, and æsthetic — are going on.

Educational importance of attention and interest. As attention and interest are terms descriptive of wide-awake activity on the part of the mind, it follows that the pupil must be attentive to and interested in the various parts of his school work, or that school work will mean nothing to him. The teacher's work will be in vain without this interested-attentive state of mind on the part of the pupil. Mental alertness is necessary in order that the important sense impressions may be selected from the total sense-impression mass constantly playing on the mind. The important features must be selected if knowledge along desired lines is to develop, while a thousand and one impressions having no present useful bearing must, as a consequence, be ignored. Without this interested-attentive state of mind, perceptions and observations will not be full and accurate; the various features will not be analyzed and compared,

and the significant ones given the proper place in observation. And not only with respect to sense impressions and observation, but also with respect to the further development of knowledge and action, is this interested-attentive state of mind all-important. On it, as we shall see, memory depends. By it useful associations of ideas are formed, and association of ideas with their proper outcome in action. The whole thinking process in conception, judgment, and reasoning is, in the same manner, utterly dependent for its value and very existence upon this wide-awake activity of the mind. And, as we shall also see, all our deliberations and decisions are simply the working-out of our interests and the activity of attention. The importance of lively interests, well directed, and of keen, well-sustained attention with respect to those matters, in school and out of school, which it is desirable to learn and to do, is too evident to need further insistence.

The securing of attention and interest. The great practical question is, How can this desirable mental activity be secured? The problem is not, however, as a rule, the disheartening one of trying to create interest and attention. It is rather the problem of directing it. Many a listless boy in the geography class has a lively interest in thoughts and schemes of his own, as any teacher well knows.

One tendency in teaching and in self-tuition should be guarded against. This has been referred to above in discussing pseudo-interest. It is an easy matter for a teacher to catch the attention of the pupil, and an easy matter for the mind of any one to be attracted. The great trouble with the practice of artificially making things interesting is that the interest ceases when the allurements pall. The subject of importance usually fails to be really opened up for the pupil by the catchy device. He is passive in the

matter, and forms the habit of waiting for the next stimulation. His mind does not become really alert. The interest is not genuine, the attention but a flash in the pan. Of course it sometimes happens that the "sensational" introduction may awaken an interest which may be transferred to the serious matter ahead. A certain gain may be realized, too, by having the recreation of a harmless entertainment; but the gains of the practice are few and far between, and the unfortunate results more than probable. The practice of relying on pseudo-interest for pupils and others is to be condemned because of its futility. It simply does not, in most cases, show itself to be worth while.

Little can be accomplished in the way of securing attention if the physical conditions are distinctly unfavorable. The pupil already wearied cannot profitably attend to school work, nor can the pupil who is weak with illness or suffering from pain. The environment must be suitable. Schoolrooms too hot or too cold prevent good work. Bad ventilation is a notorious cause of lack of interest and attention. Insufficient light or the sun's glare often interferes. Loud noises outside the room, or made by the high voice of the teacher, or the chattering of pupils, will often so distract another pupil as to make attention to his work impossible. If the physical conditions of the pupil and his environment are well considered and good, very frequent causes of lack of interest and attention are removed.

The social environment. The spirit or tone of the school is an important consideration in securing attention and interest. The normal boy likes to "get into the game," as he himself says. If the pupil has the sympathy of the teacher in his work, the teacher's enthusiasm may be contagious. At any rate, if this sympathy and enthusiasm are lacking, interest may die out, and for good reasons. The pupil is

likely in this way to respond to the teacher, and even more likely to respond to the attitudes and actions of fellow pupils. The approval or disapproval of teachers, fellow pupils, and parents is a force to be reckoned with, and so too are the ambitious impulses of the pupil, — emulation, pride, etc. These may often be called on to save the situation, and the active attention may be very aggressively given by summoning them up. We may say that all these features of the social environment of the pupil have much to do with his giving his attention to his school work and allowing himself to take an interest in it. These features taken care of, the result is not guaranteed; but in many cases the desired results are not realized because these social conditions are not made what it is very often in the power of a skillful teacher to make them.

Appropriate work. The pupil cannot be expected to be attentively interested in work that he is already very familiar with. It is monotonous, and his attention will wander to more promising fields. So long as new features of the familiar subject come up will the interest probably last. When they fail to do so, interest flags. No more can the pupil be expected to attend to any subject matter that is too new. It must mean something for him; he must find something familiar in it, or he has no use for it. Novelty in object or in feature must be brought out to catch the pupil's attention, but not a novelty which means nothing for him, having no connection with his previous notions, ideas, feelings, and questionings. Work must be given the pupil which is a gradual development for him, in the matter of ever presenting new ideas which may be attached to the ideas already in his possession. The curriculum should be arranged in such a way that it will be a natural development along with the pupil's development. This principle.

applies not only to the work of the year and the half year, but to the work of each day. This is of course a large and difficult problem, but the advantageous employment of attention and interest largely depends on its proper solution. It sometimes happens that in this way curriculum-maker and teacher are to blame, rather than the pupil, for the latter's lack of interest.

Concrete rather than abstract material. In order that interest and attention may be secured, and that knowledge may develop properly, the work must be in great measure of a concrete sort. The younger pupils, especially, are interested in individual objects and individual deeds and sayings of people. This is the natural material for them to work with, while truths which are more abstract come to them slowly and have little attraction for them. The same principle holds true in a less degree with older pupils. They too are interested in individual people, nations, products, physical objects; but while their interest is in these things, they naturally pass from them to the principles underlying their behavior. They are really interested in these general truths, rules, and principles, but only if somehow preceded in their experiences by knowledge of the many individual cases which naturally call for some explanation. In all school work, then, early and late, the interest and attention are given first to the concrete individual cases, and pass to general truths, rules, and principles only when there is some call for them as explanations or summaries of the familiar concrete material.

Change of object of attention. In order that attention and interest may be kept alive, there must be a development or change of ideas in the subject considered. New features must appear. It is not enough, however, that the attention should thus shift from one thing to another. Too

much of this is scatterbrainedness, or inability to concentrate the mind. It is not always the most wide-awake child, whose attention is thus most easily caught, who does the best work. There must be some steadiness in the matter. This is achieved by noticing the new features of the subject, that they may be given their places in an orderly scheme of understanding it. This keeping check of the new impressions, understanding them as parts of the subject in relation to one another and the whole subject, is the safeguard against mind wandering. When these two features of the case, the shifting and the checking back, are going on, the attention is doing its best work, and interest is greatest. Attention is thus naturally a matter of analysis and synthesis.

Not only is it true that there must be this constant change of attention within one subject, but, in order to maintain interest, the subjects themselves must be frequently changed. The lesson periods should not be extended to the point of weariness, or natural interest will be killed.

The awakening of interest. It often seems to be the task of the teacher to have to teach lessons that apparently have no attraction for the pupil. They are hard and dry, and interest and spontaneous attention seem out of the question. This difficulty may be partly done away with by following suggestions already made. The physical conditions of pupil and environment should be well looked after, and the social environment made stimulating. Appropriate work should be given in the various grades, and much dry and unprofitable material removed. The subject matter should be presented in as concrete a form as possible, and a proper orderly change should take place in the presentation of the ideas. Yet even when all this is done the task may not be accomplished. The pupil still may not respond.

Much may be done in the way of showing the connection between the daily task and something which the teacher may find to be of real interest to the pupil. Along this line the teacher may work very profitably. The normal function of voluntary attention is to exert mental effort with respect to ends or purposes desired by the individual. The connecting of the daily task with a genuine remote interest can, in many cases, be done with little difficulty. The geography description, history record, language work, nature study, geometry, arithmetic, and all the rest, may thus be given a genuine interest which the bare statement of facts and principles may lack. This is a most fruitful field of work for the teacher. That teacher is the skillful one who can find the pupils' interests and attach the school work to them.

In this matter of wise encouragement of the attention the fact should never be lost sight of that the only thing which counts, educationally and practically in life, is mental self-activity. It is the person himself who works out his own interests and who makes the effort of voluntary attention. This is the effective condition; and the more the individual pupil or man of affairs can take care of the whole matter of attention, interest, and their conditions, the more desirable will be the results. Both voluntary attention or effort and spontaneous attention or interest thus come normally into action. Attention will be given to any item only so long as it is needed for the clear and definite realization of that phase of the experience; but when attention shifts, it will shift to another and related item of the same situation or problem. It must shift, as we have seen; otherwise the mind will be a blank. No wise guide will expect the impossible, — to hold more than momentarily a single item before the mind. The delight of the

normal successful activity of the mind's quest will be present; but there will be, as well, all that effort of which the mind is capable, and without which, in school or out of it, genuine success is not possible.

The habit of attention. Gradually, by such methods as have been enumerated, may the habit of attention be formed. Interest will develop in the regular work of the day, and the pupil will attend to and do his work well, not because it excites, pleases, or amuses, but because it is in line with his natural growth and development as a live, healthy, normal youth. There will be no premium indeed on drudgery as drudgery, but there will be the carrying-out, in a habitual, reliable way, of the day's work, even though it be hard.

REFERENCES

DEWEY. Interest as Related to Will, Sections 1, 2, and 4.

TITCHENER. An Outline of Psychology, Sections 38-42 inclusive.

ANGELL. Psychology, Chapter IV.

JAMES. Talks to Teachers, Chapters X and XI.

CHAPTER IX

THE ASSOCIATION OF IDEAS

In a paragraph in Chapter VIII, on the attention as synthesis or association, it was said that one great result of the activity of attention is the grouping together into objects, situations, etc. of the various parts of an experience. The attention, it was pointed out, both notices the parts as parts, and groups or fuses them into units of interest. The different parts of the flower — color, odor, shape, etc. — are noticed for themselves, but they are also noticed as a unit. The same may be said of the parts of a machine, or the qualities of an apple. For our interests and our practical purposes generally, we are quite as likely to attend to the unit whole as to the parts. And of course we do not stop with the objects themselves: we also attend to and group with the objects such additional features as the situation may suggest; for example, the product of the machine, the person who holds the flower. All these elements of interest and objects of attention fuse into a whole for us, in our thought of the thing and our general attitude to it.

The same thought was brought out in the discussion of sense-perception. The association or fusion of various items of our experience into what we call a perception was found to be one of the main features of the case. In fact, as we have already seen in the foregoing chapters, the tendency of more or less distinguishable features of any state of consciousness to group together into a unit is a very strong one.

It ought to be said, too, that this associative tendency of consciousness is a basal feature of many mental processes which we have yet to consider, and to which separate names are usually given in our common speech and in books on psychology. Imagination, memory, judgment, reasoning, and volition, — all rest largely on this general activity of association. How this takes place will, it is hoped, be made clear as we proceed.

In explaining the general nature of this principle of our conscious life, which is called association, or the association of ideas, it will perhaps be most useful to regard the associations as already formed, and then to inquire into their general conditions and into the way they show themselves in our conscious life. That much of our mental life depends upon association or suggestion is a commonly well-known fact. One good story suggests another. A fragrant odor suggests some person, perhaps afar off, or a circumstance of long ago. The sight of an apple will suggest its taste, and this may lead one to eat it. The thought of one's parents may suggest the house they live in, and this one's own room, the pictures there, the idea of going home, and the carrying-out of that idea. Such examples as these point to the fact of association, — that one perception or idea tends to call up others out of past experience. Or, to speak more definitely, there may be associations between a present sensation or perception and some idea or memory, between two or more memories or ideas, between an idea of doing something and the act of performing it.

There are many features of the inquiry as to the nature, causes, and results of these associations, and where we shall begin the inquiry is a somewhat arbitrary matter. Our discussions thus far, however, have taught us to look for at least two general features of any mental activity; that

is, its physical or physiological conditions, and its more particularly mental or conscious conditions and results. This latter inquiry is, in this case, rather a complex affair, and for this reason it may be well to consider the physiological conditions first. There is another and perhaps better reason for so doing, and this is that the whole matter of association is so clearly based on activities of the nervous system that it deserves the first place in our discussion. When this feature of the case is pointed out, the mental conditions and results will be much more clearly seen.

Physiological conditions of association. Association as a matter of brain action goes back to the fundamental plasticity of the nerve cells and the resulting habits which they acquire as their activity goes on. Association is based physically on nerve habit. The earliest stimulations affect the sensory centers, the earliest movements are the outcome of activity in the motor centers, these movements result in further stimulation, and stimulation results again in movement. Sensory centers and motor centers become more and more connected by connecting neurones, or association tracts. Each experience of movement and stimulation leaves its trace in whatever nerve cells are concerned. The nervous current or impulse goes now along this series of neurones, now along that, according to the nature of the situation and the call for action. As the individual matures, more and more connecting neurones between the various centers are developed and used. Fibrous connections become more and more established between motor and sensory centers, and between both of these and the still higher centers. There comes to be a great network of brain cells, cell bodies and fibers, connected in all sorts of crisscross ways according to the nature of the individual and his sensory and active experience.

These connections are in great measure a matter of development and modification of structure, as has been pointed out in Chapters III and IV. The connections are, however, in a much more important sense, matters of function or ways of behavior. There settles down upon the brain tissues, the sensory centers, the motor centers, the higher centers, and all the connecting tracts, a great series of habits of acting according to what the stimulations, the movements, the reactions of the individual have been. The upshot of the matter is, then, that according to the law of habit, when any number of brain cells have been in action in certain ways together, they tend to act in unison a second time, and tend to do so still more strongly a third, a fourth, a fifth, and so on. This is simply owing to their plasticity and their consequent settling into habits. This means that when one of these brain cells is stimulated by some impulse, that impulse or current is carried along and discharged into the other cells with which it has been connected in activity once or twice or many times before. These cells have been associated together in action and have formed the habit of acting together. This, then, the law of neural habit, is the basis of association looked at as a brain or physical affair.

But the story is not quite so simple as this, for the reason that each one of these cells in the series just spoken of is probably a member of another series, or of many other series, according to the activities in which it has been engaged in the past, according to other stimulations and other responses in other situations in which it has been concerned. When it is again stimulated, which way will the stimulus be transmitted? To which neighbor will the current be passed on? What will determine the association simply as a matter of nervous current? The brain cell *A* has been affected in a certain way with brain cell *B*, but it has also its functional

relations fairly well established with *C*, *D*, *E*, *F*, etc. In answer to these questions we may say that the likelihood of *A* discharging into *B* rather than into *C*, *D*, *E*, or *F*, will depend upon several factors.

1. The number of times it has done so in the past, compared with the times it has discharged into any of the others.

2. The intensity or strength of the nervous impulse or current with which *A* and *B* have been connected in action, compared with that between *A* and any of the others.

3. The recency of a former connection between *A* and *B* compared with that between *A* and any of the others.

4. Very obviously, the number of former connections which *A* has had in functioning besides those with *B*,—whether simply a few, as with *C*, *D*, and *E*, or many others.

5. The general brain set or tension at the time. This last point (5) needs some explanation. It refers to the general adjustment of the brain to the situation in hand, or, in other words, to the direction from which the stimulation of *A* came. It may have come along in a series *XYZA*, *LMNA*, or *RSTA*. When the nervous current is at *A*, then, it will have a certain tendency or character on account of being in one series rather than in another. This series represents the brain set or tension at the time. If *A* has come into exercise along the series *XYZA*, and if *B* is that which has belonged next in such a series, then *A* will be much more likely to be followed by *B* than by any of the others, *C*, *D*, *E*, *F*, etc.

As we have already seen, the brain cells are many, sensory, motor, and others. The connecting fibers between the various groups of cells are countless. Hence the many connections which may be formed as channels of action throughout the brain tissue between all these centers, according to the experience of the individual. These experiences are more

or less fixed in nervous habit according to the plasticity of the brain tissues. Hence the physical basis of the whole life of association is provided for.

Mental conditions of association. Returning now to the association of ideas as a mental affair, or a series of conscious processes, our understanding of it will be more thorough on account of being familiar with the physical basis. Both accounts taken together ought to furnish a tolerably complete account of the whole matter of association.

Primary fusion. As was noticed in treating of attention, the reason for fusing or associating the various items which may be in consciousness at any one moment or in successive moments is the interest we have in them, or the fact that we attend to them together. To attend to two or more features of any experience, to be interested in them, is to produce a unity in the experience. That two ideas shall be attended to or experienced together is the primary condition of their association at the time, and is the fundamental principle of the calling up of one idea by means of another. When one idea of a group, which has been experienced as a group, comes to mind, the other members of the group will tend also to appear. If, in walking through a swamp, my attention and interest are challenged by the notes and flight of a flock of red-winged blackbirds, my thought of the swamp afterwards will quite likely suggest the blackbirds. At a certain theater one sees a part in a play enacted by some great actor. The mention of the name of the actor afterwards will probably suggest the play and his part, and perhaps the theater; and the probability in the case will largely depend on my interest and attention given to the group of ideas, the play, the part, the actor, and the theater. In forming a perception of any object, for example an orange, the various features of sensation are grouped or fused because

they are experienced together, attended to, and acted upon. The word "orange" may suggest the color, the taste, the act of eating, etc. This series of associations depends upon the primary fusion of the various features of the orange into a unity by their presence in consciousness and by the attention and interest exercised. One learned long ago that three times two are six; the ideas two, three, six, were attended to in such a way that to have the idea group three times two is to have the idea six.

Many names have been given to this fundamental process of fusion or association. We may call it assimilation or apperception. The principle of association may be stated thus: When one idea of an apperceived group afterwards appears in consciousness, the other members of the group tend also to appear. We might enlarge the statement of the principle by including act as well as idea, and might also state that the association may be simultaneous or successive. The fundamental fact is the original fusion or grouping of the ideas or acts by experiencing them together in an interested, attentive way. Any one of these features coming to mind will tend to bring along with it one or more of the others.

This general mental principle of association is the counterpart of the general physiological or nervous principle spoken of above; namely, when any number of brain cells have been in action together, they form a habit of acting in unison, so that when one of them is stimulated in a certain way, the others will also behave in the way established by the habit.

But this explanation, while fundamental, is not sufficient to explain all the cases. Again, as in the account of the physical basis of association, the story is not so simple. The reason for this is that each of the ideas spoken of has probably had in the course of one's experience many associates.

Take any word as an example: "birthday" may suggest to any one person many different memories or ideas of action at different times; the sight of the lead pencil in my hand may suggest where I got it, or that it needs sharpening, or that it is too hard to make a good impression on the paper. The question then arises, What will determine which of its many associates an idea will actually call to mind at any one time? Several factors enter into the solution of this question, and they are very like the factors spoken of above in connection with the nervous basis of association, in answer to the question as to which of the many possible courses the nervous current will take.

An idea which has been a feature of many associated groups of ideas will, in case it appears in consciousness, tend to call up the following:

1. The idea or group of ideas with which it has been most frequently associated in the past. If I have usually thought of Roosevelt in connection with the Rough Riders, the chances are that the mention of that regiment will suggest their famous leader. If I have usually thought of Pickett's charge in connection with the battle of Gettysburg, the chances are great that the thought of that battle will suggest Pickett's charge.

2. A very recent experience in connection with this idea. If an invitation has to-day come to me from a friend to visit the field of Gettysburg with him, the name Gettysburg, referred to in the course of the day, will probably put my friend again into my mind, and his kind invitation.

3. If, upon seeing a great man, I have been struck very forcibly by a certain peculiarity of his; if it has interested me greatly and called my attention very strongly to itself, the chances are great that the mention of the great man's name will suggest the peculiarity which stood out so vividly

in my mind. Vividness then, or deep interest, will determine in great measure one's associations. As was pointed out above, interest and attention are the great factors in securing a fusion of ideas, thus providing the fundamental ground of association ; so here we may say that the degree of interest and attention given to two or more ideas together will measure the probability of one of these ideas recalling the other, or others.

4. There is an additional principle which must be taken into account, corresponding on the mental side to what was called above, in pointing out the physical conditions of association, the general brain set or tension at the time of recall. That idea which is in keeping with the general interest or apperceptive set or tension of the mind at present will tend to be recalled. In other words, one's present interest or line of thought will largely determine which of many possible associates will now be suggested by an idea. If I am concerned about my health, the sight of an apple will probably suggest its wholesomeness rather than its market value. The word "trout" would suggest one thing if my sporting interest were on top, another if zoölogical interests were uppermost in my mind. If æsthetic considerations were dominating me, the sight of my chair might suggest the great propriety of having a bonfire. If I am weary, the sight of my old chair suggests comfort and rest, and has great value accordingly. One's interest and line of thought at the time, then, will largely determine what one's associations in thought and in action with an idea or perception will be.

We may now sum up the principles involved physically and mentally in the association process. Physically, the fundamental principle is that of neural habit, that when two or more brain cells have been in action together, the

renewed activity of the one will tend to transmit the nervous impulse to the other, so that the two will again act in unison. In addition to this there must be taken into the account the likelihood of *A* discharging into *B*, rather than into any of its other functional connections, this likelihood depending upon the frequency of their working together, their recency of connection, the intensity of the nervous impulse in their former functioning, the scarcity of other functional connections, and the general brain set or tension at the time.

The general mental law of association we have seen to be, that when two or more ideas have been experienced together with some degree of interest and attention, thereby fusing them into a measure of unity, the reappearance of one of these ideas in consciousness will tend to revive the others also. Which idea or idea group among its former associates a certain perception or idea will actually call up at any one time will depend upon the following factors: frequency of association, recency of experiencing the ideas together, forcibleness of the joint impression, and the general interest or apperceptive set of the mind at the time. On the mental side there might be added a further condition, — that the idea with few rivals for connection with a certain other idea in mind will have a better chance for recall than if its rivals were more numerous.

These two sets of conditions of association, the physical and the mental, will be noticed to be practically the same. This is not strange, as we are really pointing out the conditions of a single process viewed from two sides or points of view. The functioning of the brain cells in an associative way, and the flowing of the stream of consciousness in associated idea groups, — these go right along together and are separable only for our reflection.

Secondary principles of association. There are certain other principles of association, which may be called secondary principles, that express our customary ways of referring to those objects which we associate. These principles are not fundamental, but secondary, and even superficial, and may easily be seen to rest on the principles already mentioned. The first one is the principle of similarity. A stranger is seen who reminds one of an intimate friend because of a great resemblance in appearance. A landscape or a house suggests another that is very similar in appearance. In such a case there are certain features of the objects, the person, the landscape, the house, which are practically identical with the corresponding features of the objects one is familiar with. The attention being drawn to these, the other features of the familiar thing come to mind (or at least the general impression does), because these other features are the ones commonly experienced with the features which now challenge attention. One does associate objects which are similar, but only for the reason that one's habitual ideas come up in connection with the new and unfamiliar object, person, landscape, house, etc. Familiar objects, too, which are similar in appearance or way of behavior suggest one another. This may be explained, in addition to the explanation given above, by the fact that the association has probably been made before, or that they have been learned together, and their similarities pointed out, so that their association is really based on the simple principle of habit.

Another secondary feature of association is that of contrast. Occasionally, though not with a great degree of frequency, perceptions or ideas of certain objects will call up ideas of other objects when there is a strong contrast between them. The sight of the dwarf may suggest the

giant ; the fair day, the day of violent storm ; the dull gray costume, that of brilliant color ; the man who is a failure in life, the man who is a striking success. Though such contrasting objects are sometimes associated, it is not because of the contrasts holding between them that the association takes place. Such associations depend upon the fundamental principle of association, — that these contrasting features have been experienced, or attended to, together. One great way of learning anything is to have brought out clearly, not only its likeness to other things we know, but also its difference with respect to other features, objects, qualities, etc. Thus these striking differences or contrasts are our commonly associated ideas early in the process of learning. Still further, the matter of association by contrast may be explained by the fact that, after all, the contrasting objects have a fundamental common property, and in our thought of the objects the common property is the link between them. The dull gray and the brilliant color in our example have in common the feature of being a costume color ; if the two have not been definitely learned together, each has been thought of as being a costume color, and perhaps as a striking variation from what one usually sees. This last would certainly be the case in the example of the dwarf and the giant. Association by contrast, then, as we have said, rests upon association by one's having attentively experienced the two features at some time together. Just what contrasting feature will be suggested by an idea or perception will again depend upon the subprinciples of associative recall stated above, — frequency, recency, strength, and the bent of the mind at the time.

Again, we tend to associate objects, people, and things in the same locality ; also events which happened in the same day, month, summer, etc. When these associations

take place, it is not because the events happen in the same period of time, nor because the people and objects are in the same locality, but because we attend to them together; they are parts of the same interest, and thus become fused. The events of a day have a connection in our experience; things together in space we naturally attend to together. The associating takes place because the different items are lived together by us, and not because of the spatial and temporal relations between the objects. To see a person may easily suggest other members of the person's family; an event may call to mind its cause. These, and many other instances of our associations of ideas which might be spoken of, are very clearly not separate principles of association, but go back to the fundamental principle already brought out. An event and its cause are experienced together, learned together, and attended to in a common interest; hence the fusion. So with family relations, — those of father and son, brother and sister, etc.

Association as a general principle of mental activity is, in the ways we have spoken of, constantly at work determining the form and content of the present and future moments of our conscious lives. It is in one way, as we have noticed, a feature or result of the attention process, but it is of such importance that we commonly speak of it as being an independent principle. Attention and interest, discrimination and association, are not really separate, but each involves the others, and all are alike simply well-marked features of the processes of consciousness.

The effect of association and the ways of its working have already been brought out in the treatment of perception. Perceptions are possible because of this way of the behavior of consciousness called association. The same might be said and will be seen to be true of the other conscious

processes, — imagination, memory, conception, judgment, reasoning, emotion, sentiment, and volition.

Practical and educational applications. The principle of association being such an important one in mental life and development, to take it into account and make advantageous use of it should be an ever-present and consciously important aim of the teacher and of each individual in the training of his own and others' minds. The aim of education from one point of view is the development in the mind of the learner of abundant and proper associations. The full account of the application of this principle to the process of teaching, and to the effective development of the mind, can only be given in connection with the treatment of those further mental processes in which association plays so large a part, — memory, imagination, and reasoning. Here, however, the more general applications of the principle may be seen. These applications must be understood in the light of what has already been said in discussing the topics of habit, attention, and interest; for, as we have seen, association rests upon the law of neural habit and is really an expression of the life of habit, as well as a result of the activity of attention and interest.

It is all important that certain situations in which an individual is placed shall call up certain ideas, memories, or images, which in turn can direct him to right and useful conduct under the circumstances. Here the associations of ideas are between the perceptions or imaginations of the situation one is in, the meaning or full realization of such a situation, and the thought of actions to be performed and purposes to be realized by the actions so as to reach a happy issue. Such a perception-thought-action situation might be described in terms of habit, and we have done so in Chapter IV. It is a case of forming proper habits and of

properly using the habits and powers which we have. It is also a case of having rich and proper associations, so that one will not be floored by situations in which one is placed, but will have a chain of associated ideas which will enable him to appreciate the circumstances and act advantageously therein. In this mental and practical aspect we may notice the close connection between association and habit, as well as on the physical side where neural habit directs the line of association.

But association, it has already been suggested more than once, depends upon attention and interest. If we would have associations of ideas which will stand, we must attend to the group of ideas together, and must fuse them in the heat of a genuine interest. Accordingly, those associations will persist which have thus been made by the work of attention and interest. If one would form associations which will be of use, which will be right for conduct and true for thought, this end must be brought about by the proper guidance of the attention and interest.

In order that rich and varied associations may be formed by the individual, he must have some degree of richness and variety in his observation experience. This wealth of the material of associations is needed, if the ideas associated are to play their part well in the various conscious states. These ideas may become a part of the furnishing of the mind in all the ways in which learning may take place. In observation of things and people and their ways of behavior; by close examination and by general impression; by action and experiment in connection with one's environment; by study, by travel, by reading; in fact by all the ways, as was said above, in which learning and the gaining of ideas may take place, may the individual become the possessor of a body of ideas which will be of the greatest benefit. In

all this experience of learning and gaining associated groups of ideas, the teacher may be of the greatest assistance to the pupil in helping to provide rich and varied material in connection with which the desired end may be reached.

But further, as we have learned, the gaining of ideas is not merely a matter of there being an environment, no matter how rich and varied, which may play more or less strongly on the senses. Learning really takes place, and associations are genuinely formed, when the attention and interest are exercised, and that along natural lines. Here, again, by direction and encouragement the interest of the pupil may be guided and the sort of associations formed largely determined. In so far as environment, using the term "environment" to denote physical, mental, and moral conditions, can be supplied, and in so far as the interest and attention of the pupil can be influenced with respect to reaction upon this environment, just in so far can teachers determine what more or less fixed and lasting associations shall be formed by the pupil. The connection here with the formation of habit is very close. The teacher can encourage certain associations in connection with the sight of a picture, with an event in history, with certain lines of a poem, with a story, with the sight of a grasshopper, with a person in distress, with response and activity in the way of honesty, truth-telling, etc. In all the ways of supplying environment, in all the ways of the forming of habits, in all the ways of directing interest and attention, the teacher may be of great assistance in the obtaining of ideas and in the fixing of associations between them.

Those secondary principles of association mentioned above, such as similarity, contrast, nearness in space and time, family relation, cause-and-effect relation, etc., may be of assistance in showing the nature of associations which

people form very naturally and which it is well to have formed. From the first there is a tendency to group things which are alike and to discriminate those which differ. We learn by marking likenesses and differences, and hence form associations of similarity and contrast which it is useful to form. Events happening near together in time, those of the same day, year, generation, century, it is well to attend to and learn in such a way that they may suggest one another. Not that this is the final way of dealing with them, as we shall see in the chapter on reasoning; but if the events are so grouped in associated ideas (that is, in memory) we have an abundance of material to use in building up knowledge in a more reasoned way. So with associating people and things of the same locality, people of the same family, society, etc. Such associations as those of cause and effect, which stand for what we ordinarily call real relations between things, are of great value and are practically of the nature of reasoned conclusions; the discernment of relations like these ranks very high among the elements of our knowledge. Such discernment may be encouraged so that it will be the lasting and useful property of the possessor.

Whatever connections we may arrive at among ideas, whether in habit, observation, imagination, reasoning, emotion, or sentiment, the connection among them which abides is that of association by means of attention and interest based on the laws of neural habit. Associations are the habits of ideas with respect to one another, are the basis of memory, imagination, conception, judgment, and reasoning, and play a great part in perception, emotion, sentiment, and volition.

In all the study of school subjects and in all the learning life of the child, parents and teachers can be of the greatest influence in helping towards the forming of those

associations which go to make up true and useful learning and proper and efficient conduct. By realizing these facts, — that one's knowledge is to so great an extent determined by environment and by other people, that it is really a matter of forming associated groups of ideas, and that there are certain laws or principles according to which these associations of ideas are naturally formed, — an intelligent course of action on the part of teachers and of all concerned with mental development is opened up. These applications of the principles of association to the work of the teacher and the matter of learning have been, indeed, of a general nature; but they indicate the trend of the process of learning, and will be seen to apply throughout its whole range. Association itself is a fundamental characteristic of the behavior of consciousness. More specific and definite applications of the principle of association must be looked for in the treatment of memory, imagination, reasoning, etc., where the general movement of association finds its practical expression in the way of building and using knowledge.

REFERENCES

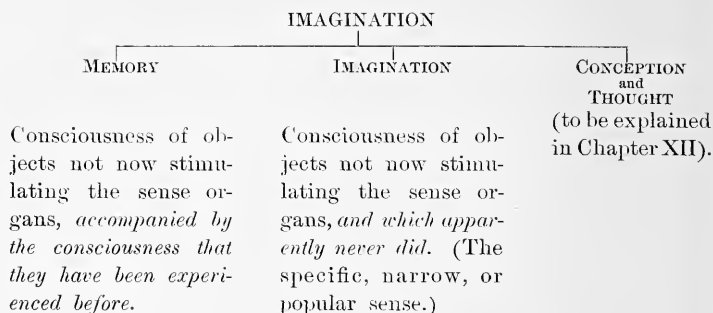
- JAMES. Psychology, Briefer Course, Chapter XVI.
THORNDIKE. Elements of Psychology, Section 45.
BALDWIN. Elements of Psychology, Chapter XII.
MÜNSTERBERG. Psychology and the Teacher, Chapter XVII.

CHAPTER X

THE IDEATIONAL PROCESSES: MEMORY

Memory as one of the ideational processes. In Chapters V and VI were described the conscious processes of sense stimulation, sensation and perception. These are the foundation of the mind's knowledge, furnishing it with material for higher development. In Chapters VIII and IX the nature of those general ways of the procedure of the mind, attention and association, in developing knowledge was set forth. We are now come to the further processes and product of conscious life, which may be called the ideational processes. These will be discussed in this and the two following chapters under the headings Memory, Imagination, and Conception and the Thought Process. They are the higher ranges of conscious processes, being concerned with the fuller development of the mind as a knowing agent.

By the ideational mental processes is meant those conscious states which consist of images and ideas. The mind has images or representations of objects even when the latter are not stimulating the sense organs. This imaging function of the mind might be called imagination. The term used in this way would be a comprehensive, generic term, including as species under it what we commonly call memory, and the thought processes, as well as what is known as imagination, which is in popular thought and speech contrasted with memory. These uses and distinctions will be made plain as we proceed. The relation of the generic term imagination to its species might be represented thus :



We shall first discuss memory, and after that imagination, although the order might just as well be reversed. Both depend on the association process. Both depend originally on the processes of sense experience. Both depend on attention and interest. Both are in turn concerned in the thought process and in volition. Both depend physically on central stimulations of the brain cortex, rather than directly on peripheral or sense stimulation. Under imagination the generic nature of the ideational processes will receive some consideration, as well as what we commonly call imagination. First, however, we shall take up those ideational experiences which bear the mark of memory.

Definition. It is not difficult to cite examples of memories. The events of yesterday as I remember them, those of the past few moments or those of last year as they come now to mind, are indeed very familiar experiences. These events are not occurring now, but they did occur. They were events in my experience, and now I am living them over in memory. We may then define memory as the living over again in our consciousness of an event which is no longer present to sense, and being aware that we have experienced it before, — this awareness being the differentiating mark.

The term "memory" might be used to denote any living over again of an experience as a whole or in some of its parts, even though it were not accompanied with the consciousness that we have experienced it before. But in our common speech, and indeed in psychological usage, it is customary to mean by the term just the memory proper, as we have indicated in the definition, a real part of the experience being the recognition or familiarity feature. The general process of having in consciousness a revival of a past sensation or perception is often called representation. It is also called ideation, the having of ideas (the ideational process referred to above), or imagination, the having in the mind imagery or images. In the chapter on imagination we shall again refer to this representing or imagining phase of our conscious life.

In discussing the subject of memory, it will be well to keep in mind a clear distinction between the physical and the mental aspects of the case, that is, between the brain activities and the events in consciousness. Both aspects stand out strongly, and both are needed to make the story complete.

Phases of memory. There are certain terms used in connection with memory processes which indicate stages of memory. We speak of a retentive memory, or of facts being retained in memory. We also speak of memory as the recalling of past experiences. "I do not remember" and "I do not recall" are but different ways of speaking of the same experience. "I remember" and "I recollect" are used interchangeably. To recognize a person mentioned in conversation as an individual whom one has known is to remember him. Retention, recall, and recognition are three aspects or stages of the memory process, as we commonly speak of memory, and so we may formally state that the

three main features of the memory process are retention, actual recall or reproduction, and recognition. The remembered experience must have been, by some means, retained ; it must actually reappear in the stream of consciousness, and, if really remembered, must be recognized as having happened before in our experience.

Conditions of retention. Let us ask, then, how an experience is retained and what are the conditions of retention in memory. To begin with the mental side: the experience is not retained in consciousness or stored up in the mind in some mysterious way ; our minds are not filled with any such storage compartments ; we must look elsewhere for the retaining of the experience. We may detect, however, the mental conditions which account for the retention, and these it is important to note. First, that experience is retained in memory which at the time was given a great deal of attention. The unimportant items of experience are not usually retained, but the important ones are attended to and consequently retained. By being attended to, these aspects become vivid and definite. Second, those things which interest us deeply or work upon our feelings are likely to be retained in memory. These are important for us, we attend to them ; they are forcible, achieve a clear and well-marked place in experience, and we are not likely to forget them. Third, experiences which are often repeated tend to impress themselves upon the memory ; the repetition makes them ever clearer and more and more a part of the mental equipment. Those mental experiences, then, to which we are attentive, those which are important, vivid, intense, and stir the feelings, and those which are often repeated, tend to be retained most strongly in memory. In other words, the mental conditions of retention are attention, interest, and repetition.

To cite these mental conditions, however, does not explain why these experiences should be retained nor on what retention depends. The most satisfactory explanation is in physical terms, that is, in terms of the brain processes concerned. Here we have to fall back on the law of nervous habit. When once the brain centers behave in certain ways they afterward tend to act in these same ways. Experiences are stamped, as it were, upon the tissue of the brain. These modifications of cell structure and function are more or less well retained, and this retention is that on which this phase of memory depends. We can see, then, very clearly why the mental experiences cited above should be retained. To attend to an impression and to be interested in it means that a very lively action is going on in the brain cells concerned. The intensity or strength of the action of the brain cells means genuine retention of the modification of structure and function. Repetition of the stimulus aids in the same process. Cells are modified and paths are made, so that when the proper stimulus arrives and the slumbering cells are again awakened, it is shown that the experiences have been faithfully retained by the brain.

We have now cited the mental conditions of retention and the physical basis on which the fact of retention depends. The next topic in order will be the second phase of the memory process, the actual reproduction or recall of a past experience.

Conditions of recall. As we have already seen, the recall of a circumstance, a name, an experience, an event, depends upon the process of association. This process of association may be explained, as was pointed out in Chapter IX, on The Association of Ideas, in terms of brain processes and in mental terms. Let us note again the main feature of association on the physical side. Here again, as in retention, we

have a case of habit of the nerve centers. Cell centers are modified by their stimulations, and association tracts are established between various centers and groups of centers. Whenever anything occurs to set up activity in any one of these centers, activity is also set up in some related center. The laws of brain association hold here and determine the course of activity of the nervous force. On the mental side, too, we merely have to repeat the story of the association of ideas. One event is called to mind by another memory or present perception. We thus remember because we associate. Those items of our past experience will be recalled which come up in the regular way of association.

On these laws of association physically and mentally will all our recalling of past experiences, names, events, dates, etc., depend. More specifically, recalling or actually calling to memory past experiences will depend, first, on the retention of these experiences as explained above, by means of the conditions named, physical and mental; second, *physically*, on the great number and persistence of the brain paths, or association tracts connecting the various cell groups, upon which the association process depends; *mentally*, on the great number of connections among ideas established in the course of one's experience. The more thoroughly a fact or event is learned or experienced, now in one connection, now in another, the more likely will it be to come up in memory. The reader is again referred to the statement of the laws of association as given in Chapter IX. A formal statement of those laws is at the same time a statement of the conditions of recall.

Conditions and nature of recognition. The third feature of the memory experience is its familiarity, or the consciousness that it is the living over of a past experience. Mere retention and reproduction of a name would not impress one

with a real memory of it, though there might be a feeling that the name itself is familiar; but when the name suggests the look of the person for whom it stands, the place where the person was last seen, and the various circumstances of our meeting, then there is a real memory and recognition. It is the calling up of the various ideas associated with the name that gives us the whole memory in the way of familiar recognition. We usually recognize an old idea in so far as we are able to call up these old relationships.

It sometimes happens that a vivid imaginary object or set of circumstances becomes so clear and definite in the mind, the features of the case seem so real and circumstantial, that the mind believes in it as a memory, or, in other words, seems to recognize it. A good illustration of this is portrayed by George Eliot in "Silas Marner," where a peddler was under suspicion in a case of robbery. "Mr. Snell was correct in his surmise that somebody else would remember the peddler's earrings. For on the spread of inquiry among the villagers it was stated, with gathering emphasis, that the parson had wanted to know whether the peddler wore earrings in his ears, and an impression was created that a great deal depended on the eliciting of this fact. Of course, every one who heard the question, not having any distinct image of the peddler as *without* earrings, immediately had an image of him *with* earrings, larger or smaller, as the case might be; and the image was presently taken for a vivid recollection, so that the glazier's wife, a well-intentioned woman, not given to lying, and whose house was among the cleanest in the village, was ready to declare, as sure as ever she meant to take the sacrament the very next Christmas that ever was coming, that she had seen big earrings, in the shape of the young moon, in the peddler's two ears; while Jinny Oates, the cobbler's daughter, being a

more imaginative person, stated not only that she had seen them, too, but that they had made her blood creep, as it did at that very moment while there she stood."

In recognition, then, we have the central idea, and in addition to this, the ideas, more or less complete, experienced with it in times past,—the definiteness of the recognition depending upon the completeness of the revival of associates, the reestablishment of its setting. There is probably more than this involved in the case. There is an adjustment of the self to the revived circumstances, resulting in consciousness in certain organic feelings which have a decided tinge of agreeableness. We feel at home in so far as we recognize. This agreeable feeling may indeed soon be replaced by any unpleasantness intrinsically associated with this particular person or event which we recognize, but the first wave of consciousness in the case is pleasant. Recognition as a phase of memory, then, may be said to consist, first, of the reproduced idea; second, of the associated ideas or setting of the experience; and third, of the "at home" feeling, temporarily at least, pleasant.

The "at home" feeling, the mark of recognition, we have just noted to consist of certain organic feelings resulting from the adjustment of the self to the revived circumstances. Just what does take place is not entirely clear. Certain extreme and yet very common exhibitions of it may, however, give us a clew. By these are meant the lighting up of the face, the attitude on the part of the body of "going out" to something, greeting, as it were, the recalled circumstance. Then there is the even more strongly expressed exhibition of actual recognition and greeting of a friend on his return after a long absence. The whole psychophysical organism seems to respond, and the result in consciousness seems to be the feeling of familiarity, or recognition. Even in the less

expressive cases of the experience, in ordinary memory, the inner bodily reaction is probably of much the same sort.

Recognition in perception. It should be added that we may have this same recognition experience in a perception. Some object or person perceived may be recognized as familiar. In Chapter VI, on perception, the fact was mentioned that oftentimes a perception is recognized. The only difference between recognition in perception and recognition in memory would seem to be that the first factor in the case of perception is the consciousness of the object now present to the senses, while in the case of memory it is the recalled central idea. With this exception, the total state of mind called recognition is the same in the two cases.

The sense of time in memory and perception. An important feature of the memory experience, closely connected with recognition if not included in it, is the consciousness, more or less definite, of the date of the occurrence in our past experience. If the date, hour, day, month, or year is thought of at the time of occurrence, this item will be one of the associates of the remembered idea and will be a part of the general recognition. This is, however, not always, perhaps not very frequently, the case, and then our placing the memory in time is of a more indirect sort. Quite frequently the association of the event in question as a matter of time is merely that it happened a long or short time before or after some other event, which we perhaps remember more definitely as to the time of its occurrence. "Quite recently" or "a long time ago" may be as definite as we can be in the case. Here comes in our judgment of the lapse of time, or duration. The time of the occurrence will be estimated in the near or remote past, and in a certain degree of nearness or remoteness, according to the conditions which go to determine our sense of the lapse of time.

In Chapter VI, on perception, it was also intimated that one's consciousness of the time aspects of experience was important both for perception and for memory. It becomes necessary to say a few words on the subject here.

The two main aspects of time experience are *duration* and *succession*. Our experiences of events are that they last for a more or less definite period, and that some come before others, while still others follow. It is of events lasting a certain time and succeeding one another that we are conscious. When we speak of a more direct consciousness of time,—that is, time by itself, or empty time,—we are simply referring to an abstract idea. How abstract ideas or concepts are formed we shall inquire in Chapter XII. The abstract idea of empty time is neither perceived nor remembered, and so it need not concern us here. What we have experience of is not time, but the events or happenings themselves.

We use the term “present time” in several ways. We may speak of a mere point of time, having no duration, as the real present. For, as soon as that moment comes, it flies and becomes past; and before it comes, it is still future. Another way in which we speak of the present refers to certain more or less arbitrary sections of time's flow, as the present minute, hour, day, month, summer, winter, year, etc. None of such “presents” are directly experienced all at once. They refer to a certain series that we mark off for purposes of convenience. Psychologically, the term “present” includes that amount of time experience which we can be directly aware of at once. This is more than a point, for such could not exist consciously. But it is less than most of the so-called “present” times. What one pulse of attention can grasp in the experience of flowing events may properly be called present time psychologically. This

may be from a small fraction of a second, in some cases, to a few seconds in others,—twelve seconds being, apparently, the maximum.

In early life the mind is not directly conscious of duration, any more than it is of length or location in space. Certain kinds of experiences, however, such as waiting for food when hungry, or waiting for the next tap of sound when interested, tend to make it gradually appear. The feelings being involved, and wants being present to be satisfied, the “not-yet,” or the wait between two satisfactory experiences, tends to stand out prominently. After a while the “not-yet” seems to be known and experienced, more or less definitely, as duration. So in the case of succession. A quick change in the stimulus—now happily present, now alas! gone—seems to make the “now” and the “not-now” stand out strongly. Repeated experiences of this sort—the feelings and interest and attention being involved—seem to be the beginnings, crude at first, of the idea of succession. In some such way does the mind, by attending, gradually get these two main time ideas, duration and succession.

Perception or judgment of duration is notoriously inaccurate. If the members of a class are asked to raise hands when a minute has elapsed, no external aids to time-judgment being relied on, some hands will probably appear as soon as twenty seconds, and usually all hands are up before the minute has gone. The average will probably be about forty seconds. When time hangs heavy, when there is little of interest going on, when in pain or suspense, the minutes or hours move with leaden feet, and duration is overestimated. On the other hand when all is joyful, when one is busy and interested, then one is surprised that the time has sped.

Ah, never doth Time travel faster,
Than when his way lies among flowers.

Practice seems to improve this capacity for judging durations, and yet our main reliance is on clocks, watches, day and night, etc., for keeping people at one in this particular. It is quite likely that the mind has failed to develop great exactness in this matter on account of these more or less artificial helps and correctors.

The extension of our notions of duration and succession into the past and future is, of course, the mind's constant practice. Minutes, hours, days, months, years, centuries, being a sort of arbitrary scheme, make a kind of framework for this. Gradually "before and after" and "lasting a certain time" come to be second nature for us in arranging experiences gone by and experiences to come.

Localizing our past experiences more or less exactly in time is an important feature of memory and has already been spoken of as a phase of recognition. One rather curious aspect of the case of remembering durations is that the mind behaves in a way exactly the reverse of the way it behaves when experiencing the events themselves. In memory the time filled with many and interesting events, times of joy and excitement, seems to amount to much more in the way of duration than does the time filled with memories of dull, uninteresting days when nothing in particular seemed to happen. The events expand in the one case, and shrivel in the other. One's retrospect is not so much of objective time as it is of actual experiences, and so we make our underestimates and our overestimates. This seems to correspond somewhat with the fact in spatial experience that we judge filled spaces to be greater than spaces where few objects intervene.

Recognition was seen to depend largely on the degree to which the accompanying circumstances were reinstated in memory. Here the relations of events as before and

after other events, together with associations of them with certain days and dates, seem to be the factors which determine the mind in placing events in their time relations in memory.

The training of memory. We have noticed the nature of the process of memory as a conscious affair, and in general the conditions of remembering. Let us now point out more definitely the features of the case as we apply them in the process of education.

The chief work of the teacher and the learner in the matter of memory is to see to it that the conditions of retention, reproduction, and recognition are fulfilled. In what does the fulfilling of these conditions consist? These conditions are of two classes, the physical conditions of body and brain, and the mental conditions. It is the latter sort that are mostly under our control, and it is to these, for the most part, that the attention of the teacher must be given.

The quality of the nerve cells of the brain is, for each individual, practically a fixed affair. Of course these nerve centers are in a better condition to retain impressions in health than in ill health, in a state where body and brain are rested rather than where they are tired, in youth rather than in old age. These conditions should be looked after as best we can, and our teaching and learning carried on when these conditions are at their best. If the physical conditions of obtaining sensations and perceptions are lived up to, and if careful attention is paid to those general conditions of the most efficient activity of the brain cells, then about all has been done that can be in the matter of inducing retentiveness as a general brain capacity. For better or for worse, the pupil's brain retentiveness is what it is, and at best is subject to but little change, and the teacher's task is in so far a comparatively simple one.

But the mental conditions of memory — that is, of retention, reproduction, and recognition — are such that much can be done by teacher and learner in the way of development. To begin with, we may say that the great secret of memory is in the *learning* of that which one would remember. Take care of the learning, and the remembering will take care of itself. In order to learn a thing well, the attention must be devoted to it. Then will the thing to be learned be clear. If the material to be learned is well attended to, mental analysis and synthesis will take place. The parts will be clearly understood as separate items and also in relation to one another, and retention will be likely to result. The subject must also awaken the interest. Then will the thing to be learned be vivid. It must be in line with real interests and express the real life of the person. These are, as we have seen, two of the main conditions of retention. If studied in this way, the various parts of the subject will be understood, they will have a meaning each for many of the others, the relationships between this and other objects of study and experience will begin to stand out clearly, and one will really become familiar with the matter in hand. It was also pointed out that repetition is conducive to retention. In the matter of repetition two points should be carefully attended to. Nothing should be repeated over and over which is not well understood. First understand and then repeat. No amount of repetition will take the place of good teaching and attentive study. *Bare* repetition is not the most serviceable sort. To repeat in the way of bare repetition is likely to kill out interest and to render the fact so repeated isolated and useless in one's knowledge and remembrance. The repeating should be carried on largely in connection with new work. To use the fact for a new purpose is much better than bare repetition. Express the idea

in all practicable ways, and the idea will become clearer and be better retained. These mental conditions of retention may be carefully looked after in all subjects taught in the schoolroom. The problem is one of the way of learning, rather than directly a matter of retaining. To learn the thing in the attentively interested way, so as to really know it, to go over it again in review in the way spoken of above and in all practicable expressions, — these are the conditions for the most probable retention of the matter in hand.

We have spoken of retention; how about reproduction or recall? In treating of the conditions of retention as applied practically, we have incidentally answered the question as to the taking care of this second feature of the memory process. The likelihood of the recall of an item of knowledge depends on the number and strength of its associations with other features of our knowledge. The very obvious corollary for our educational work is that facts should not be learned by themselves, but in connection with all the other facts and principles with which they naturally belong. The relationship between this item of knowledge and other items inside or outside the schoolroom and school work, other items and principles in the same subject of study and in other subjects and in practical life should be clearly seen. Then will there be rich and interesting associations with this item of knowledge, and one will be able to recall it when needed. The associations thus established will be the firmer by being striking, interesting, frequent, and carefully attended to, and thus will become part and parcel of one's experience.

The same principle holds with respect to recognition. An item of knowledge or an event in one's experience depends for its recognition on our being able to recall its setting. If the matter in question is thoroughly learned, if

it becomes genuinely interwoven with those other features of experience with which it naturally belongs, then will the recognition be the natural consequence upon recall.

It is not difficult to apply these simple principles of memorizing to the specific feature of school work or of any other practical activity. If attention and interest can be secured, the rest is simple. If these are secured, if the perception is exact and definite, if that which is studied is thoroughly understood, if it is often repeated and variously expressed, especially in connection with new items, if it is learned in thorough association with its natural connections, inside or outside the schoolbook and schoolroom, in the same subject and in other subjects, and then if the physical condition of the body and brain are normally good, the remembrance of what the pupil learns will be as satisfactory as one could reasonably ask for.

REFERENCES

JAMES. Psychology, Briefer Course, Chapter XVIII.

JUDD. Psychology, pp. 231-241.

THORNDIKE. Elements of Psychology, Sections 10 and 46.

SULLY. The Human Mind, Vol. I, pp. 318-329.

MÜNSTERBERG. Psychology and the Teacher, Chapter XVI.

TITCHENER. An Outline of Psychology, Chapter XI. (Reference also for Chapter XI of this book.)

MILLER. The Psychology of Thinking, Chapters VIII to XV. (Reference also for Chapters XI and XII of this book.)

CHAPTER XI

THE IDEATIONAL PROCESSES: IMAGINATION

In the discussion of sense-perception, and more especially in that of association and memory, reference was made to a feature of our conscious lives which is ever present, namely, that of having images or representations of our sense experiences. Sensations and sense-perceptions come into consciousness owing to stimulations of the end organs of sense. The perception, however, is, as we have seen, largely made up of images of past sensations which fuse with the present sensations. A memory is not a sensed or presented experience, but is imaged. So are the ideas referred to in the term "association of ideas."

This imaging, or having over again in this peculiar way, of sense experience, is, as far as the nervous basis of it is concerned, an affair of central stimulation rather than of the sense organs. The stimuli which play upon the sense organs make, as we have seen, a decided modification of brain tissue. The sensations, which are the reports in consciousness of these stimuli, pass away; but the brain cells, being plastic, in some way retain the tendency to act in this way again. When, now, these sensory cells, or higher groups of cells connected with them, or both it may be, — the exact cells concerned not being surely made out, — act from some stimulus within the brain itself, the result in consciousness is an image, the counterpart of the former sensation. The experience of imaging, or the having of

images, might be called memory, as has already been pointed out in the previous chapter. It is better, however, to reserve that term for memory proper, which was defined as the living over again in our consciousness of a past event or experience, accompanied with the consciousness that we have experienced it before. Images of past experiences fill to a great extent the stream of consciousness, and it is these which are the items associated in the process called the association of ideas. In perception they were generally referred to as memory images, though they were not necessarily, in the strict sense, memories.

Definition. This general imaging or representing function of the mind may be called imagination. It is the consciousness of objects which are not now stimulating the organs of sense. Imagination is, in this way, as was explained at the beginning of Chapter X, a very large, inclusive term, embracing what we call memory, association of ideas, and even conception and reasoning, as well as imagination in its popular use. Each of these has, however, some specific feature which calls for separate discussion. Imagination in its generic sense is simply the having of images. In our popular use of the word there is a narrower meaning, wherein imagination is contrasted with memory. In daydreaming, in building air castles, and in making plans, we use imagination of the narrow sort. So the poet in his fancy, the artist in dreaming out his ideals, the composer in his musical production, and even the scientist in suggesting his new hypothesis. This particular use of the term "imagination" is a valid and useful one.

In an account of the imagination as a mental process both uses of the term must be kept in mind: first, the general function of the having of images; and second, the particular one of having images which are not consciously

memories or the reproduction of the facts of experience as they were originally presented to consciousness.

Images being the copies of sensations, it follows that we can have no images which have not been at some time, as sensations, actually stimulated by objects. Our having of images, even what we call the boldest flights of imagination, depends upon the sense experiences we have had, and upon their making so strong an impression that copies of them arise in consciousness. But do we not imagine all sorts of things which we have never experienced? No doubt we do; and yet, as we shall see, all these flights of fancy somehow have for their raw material very commonplace copies of sensations which at one time or another have been experienced through the medium of our sense organs.

The material of imagination. As images are copies of sensations, we may have, presumably, as many different kinds of images or imagery as we have kinds of sensations. We see colors and perceive forms, and may have images of color and form; so with sounds, tastes, smells, pressure and touch, heat and cold, etc. We sense what it feels like to move, and have copies of this in motor images or imagery. It would seem that all these classes of sensations might be on a par so far as their reproduction in imagery is concerned; but an appeal to the reader's own experience will confirm what has been pretty well made out by careful inquiry, — that it is not at all common or easy to get clear images of taste, smell, and temperature, or in fact of any sensations except those of sight, hearing, touch, and those connected with movement. Taste and smell images are certainly not frequent. Most people can bring to mind imagery or images of sights, sounds, and touch and movement experiences. These are what we call visual, auditory, tactual, and motor images.

People differ very greatly in this matter of having imagery. Some have a much greater total amount of it than others. Some have a flood of rich and exact images of colors and forms, — are good visualizers, it is said. Some excel in tone images, that is, can represent to themselves in a distinct and satisfactory way simple tones, clangs, etc. In others, movement and touch images, or perhaps one or the other sort, will be quite prominent in their picturing. It usually happens that some one of these types of imagery is more prominent than any other type. Some people seem to have all these classes of images, or at least the majority of them, pretty full, rich, and clear. Many more have, as was just intimated, some leading type rather full and clear, with the other images meager. Still other people have none of them very clear, and their imagination is rather poor and thin. As it is out of this raw material of images that all so-called products of imagination, flights of fancy, etc. are made, the imagining power of each person will depend upon the type of his imagery and upon his being a good representative of his type. Of course it will depend on other things as well, which will appear in the discussion, but at any rate, people have decided differences in their elementary imaging power. We have now answered the question as to the source of the material out of which imaginary constructions are made, and we have also spoken of the general quality of this material, and of the fact that this material differs considerably in different people.

Function of imagination. The next question which it is perhaps natural to ask is this: Why do we imagine, or have in consciousness, simple or complex images, or imaginary products? The first and most obvious answer, from a practical point of view, is that without these images our lives could not go on as well as they do, if indeed they

could go on at all. We should be tied down to our sensory-motor habits of reaction, and to whatever advantage in living we could derive from getting simply sensations and crude sense-perceptions from our immediate environment. No doubt these sensory-motor habits are very important, and no doubt life could be precariously carried on by the aid of sensation groups; but it is only when we can have images of what our past experience has been, when the copies of our sense experiences stay with us in the form of images, that we can act to the greatest advantage. These images are necessary to the formation of perceptions. They give meaning to sense stimulation. By them we look before and after, and so adjust present action that it will fit in to advantage with our whole experience of what the world of things and people about us is like. We must be able to picture what the condition of the future may be and what the present act will mean for the future, if we would have our acts of the greatest advantage for ourselves and for others. That we have images, or the general power of imagination, is a very great need of our lives.

Second, we have deep-set natural tendencies or promptings to use images and to build them up into many complex forms. All these general instinctive tendencies find expression in picturing to ourselves those situations which would satisfy our impulses. The final expression is, of course, the actions to which these imaginings lead us and the consequent satisfactions which are thus derived. We have impulsive cravings, we desire, and so we dream. We seek the pleasant and avoid the unpleasant. We would become famous, would have wealth and power, would gain friends and try to please them. Our imaginations are thus spontaneous expressions of our natures. The images get freed from the facts of our past experience, this and that feature

is taken from its old setting, and there is unrestrained play of fancy. This free picturing gives us a chance to build up all sorts of imaginary products prompted by our instinctive cravings. These cravings may answer to such instincts and emotions as fear, revenge, love, sympathy. They may even take those forms prompted by the deep-set love of the normal human being for the good in conduct and character, for the beautiful in its many forms of expression, and for the finding out of truth. We are thus prompted by our natures to leap beyond the bounds of the present, and to make for ourselves representations of ideal realms. These images themselves, in a measure, satisfy, and lead to still further satisfaction in conduct. In answer to the question, then, why we imagine, we may say (1) because images enable us to carry on our lives in much more advantageous ways than would be the case without the aid of imagery; and (2) because we simply cannot help doing so, there being within us deep-set impulsive tendencies which find in great measure their adequate and satisfactory expression in images.

Early exhibition. Professor Major, in his book already quoted from, has some interesting observations on the development and use of imagination in children. "In his eighteenth month R. would pat on the floor with his hand and cry 'dee' when he wanted an article placed on the floor where he could get hold of it. . . . In the thirty-first month the child frequently imagined huge O's which he wanted me to draw for him, expressing his desire for the big O by stretching his arms far apart and above his head. . . . During a rainstorm, in R.'s nineteenth month, he went about the room closing the inside shutters, to keep out the rain as he supposed. . . . On the second day of the month (the twenty-fifth) I gave him (R.) a rag doll, made by

tying a knot in one corner of a handkerchief, which he laid in a baby crib and then began to beg for a bottle so he could feed the doll."

Major also quotes the following bit of appreciative writing concerning imagination in childhood: "There sits a little charming master of three years before his small table, busied for a whole hour in a fanciful game with shells. He has three so-called snakeheads in his domain, a large one and two smaller ones; this means two calves and a cow. In a tiny dish the little farmer has put all kinds of petals; this is the fodder for his numerous and fine cattle. . . . When the play has lasted a time the fodder dish transforms itself into a heavy wagon with hay; the little shells now become little horses, and are put to the shafts to pull the terrible load."

Forms of imagination. The next topic to concern us, suggested by the previous one, is the forms which the imagination takes. There is a common classification of imaginative processes which it will be of some use to follow, — that into passive or reproductive, and active or productive. Passive imagination consists of the free and unguided play of imagery along chance lines of association, while active imagination consists of that play of imagery which is, in a measure, guided by the direction of attention. The terms "passive" and "active" are not altogether happy ones, for in one way the passive imagination is as lively, or active in that sense, as is the active imagination. In fact it is often the case that the play of images is of the liveliest possible sort when the imaging is passive, while active imaging under direction may be comparatively slow and inactive. Of course, too, the terms "productive" and "reproductive" must be used guardedly. In one sense all imagining is reproductive, in that it must all be a copying of sense experience; in another sense it might

be said that all imaging is productive. Not that anything is created by the imagination, but that all imaginings are more or less modified copies, in some combination or other, of former sense experiences. However, there is a distinction between the free, passive, uncontrolled reproduction of images along chance lines of association, on the one hand, and the more controlled, actively attended to, intended production of new combinations of images on the other.

Those states of mind called daydreaming, reverie, etc. might be cited as examples of the passive imagination. Here there is no attempt to control the imagery, but its course is determined by our associations and by the chance and accidental promptings of the moment. We give ourselves to our chance interests; our fancy takes its varied flights, and its fantastic or humdrum course seems to be undirected by us. This is a very well-defined form of imagining, and in that we seem passive and involuntary in the experience, it is well enough named passive, even though it may be, as was said above, of a very lively or active sort. It should not be forgotten here that all the material for these fancies has been derived from our sense experience in the past. Even when new combinations are arrived at, the simple material is not new. Here, as in the active sort, imagination does not build with its own creations; its varied structures, old and new, are built of the material furnished by sense.

No hard and fast line can be drawn between the passive and the active imagination. There are imaginary constructions which it would be hard to classify as either. There is a gradual transition from the one to the other. In so far as the play of images is controlled by us, in so far as ends or purposes are set up towards which the imagery is directed, — in so far the imagination becomes of the

active, productive, constructive sort. When a state of consciousness consists mainly of a play of imagery controlled and directed by the attention to some end or purpose, we call that conscious state one of active imagination.

Varieties of constructive imagination. There are three main phases of the active, productive, or constructive imagination, according to the nature of the ideal set up for realization and the consequent form of the imagery. These phases are the æsthetic, the scientific, and the practical. These correspond to the general ideals of the beautiful, the true, and the good and useful, and have corresponding sentiments, as we shall later see.

The active imagination as æsthetic, while more or less present in the conscious states of all people, is seen in its fullest exercise in the minds of those whom we call artists. The poet in picturing to his mind scenes and incidents, and their expression in beautiful forms of words; the novelist and the dramatist in their delineation of motive and character and their representations with due regard to form of places and people; the composer in his dreaming out of melodies and harmonies and symphonies, hearing them where there is no sound; the painter and the sculptor who present on canvas and in marble their images, beautiful in suggestion; the architect who pictures in his mind the building to be, in all its noble strength and beauty, — all these exercise in their art what we call the æsthetic imagination.

The active imagination as scientific is of the greatest use in the search for knowledge. This is present in all minds to a greater or less extent, but is seen in its fullest expression in the scientist in finding out new truths concerning the world of people and things. He must make guesses, must frame hypotheses, must picture to himself how this and that would behave; he must, in other words, use his

imagination freely, if he would wrest answers to his questions from nature. It is not enough that he should observe and remember ; he must in a sense get away from his facts, and advance by means of his freed imagery. The same may be said to hold true of the inventor. He must be able to picture to himself the ways in which natural forces would behave under certain circumstances, and must image to himself ever new circumstances and combinations of his materials. His imagination must be lively and active and of the scientific type, as well as of the next type which we shall describe, — the practical.

The active imagination as practical is in constant exercise in most minds. The boy in his play is constantly picturing out to himself new things to do, and how he and his playmates may do them. The politician who would succeed must be able to picture to himself situations and conditions: how this man can be influenced, what will appeal to another, where appeals must be made to good judgment and sound morals, where perhaps bribes will be the easiest and most effective means, — all these, and a thousand other considerations and pictures of men and circumstances, must he revolve in his mind in order that he may act to advantage in furthering his plans. The "boss" needs a great imagination. The merchant must be able to image to himself the conditions which will prevail during his next year's business, — what articles will be most called for, whose help he can rely on for financial assistance, the best ways to display his wares, novel methods of appeal to customers, etc. The most practical person is thus called upon to use his imagination to a great extent, and his success will depend, among other things, on his imagery. Of course, in all these cases of the working of the practical imagination, as in that of the æsthetic and scientific as well, the mere

presence of an abundance of imagery will not in any way guarantee the ends desired. We are merely insisting here on the fact that the imagination is in very lively exercise in all these natural activities of people in everyday life.

Imagination and thinking. Just as there is no hard and fast line to be drawn between the imagination as passive and as active, so there is no absolute distinction between the active imagination and what we call thinking or reasoning. Especially in the scientific and in the practical imaginative constructions reason is extremely active. We must think and reason by the aid of images. In this description of the imagination stress has been laid on the fact of the presence and flow of imagery; in thinking and reasoning stress is laid on the meaning of the imagery. The same mental state might, then, be called active imagination and also reasoning, according to the feature of the case it was most desired to point out. When we speak of image or imaging we are thinking of the image just as it is, for its own sake. When we speak of concept or idea the reference is to the meaning of the image or its bearing on the discussion in hand. The terms "image" and "idea" are often used interchangeably. The image becomes an idea when it is regarded as a symbol of some further meaning. In thinking we operate with images as ideas, as will appear in the next chapter. In reasoning there is a movement of the ideas with respect to some end or goal set up as the purpose of the reasoning, such as the solution of a problem. In this we see again a very close connection between reasoning and active imagination.

Relation of imagination to memory and association. It is already clear that the imaging carried on by the mind is not a direct copy of the mind's sense experiences, in the sense of being a faithful reproduction of them with the

same old scenes introduced, in the same order, etc. Only the bits of experience, larger or smaller, are copied, and these for the most part appear in imagination in new constructions. In that part of the general imaging power of the mind called memory, we are supposed to have these copies in full, reproduced exactly as they took place in sense experience. It is not merely a memory or imaging of bits of experience that is supposed to take place, but a reinstatement of whole situations, with no piecing out.

Many times when we are recollecting a set of circumstances and relating them, we are conscious of gaps where we cannot remember the items exactly. We cannot call to mind with full recognition every feature of the case. In such instances our imagination fills in the gap with images borrowed from other connections. We feel that it was probably that way. If we wish to be very careful in our testimony we explicitly note the gaps and speak of them or of our imaginary fillings. If there is no call to be so careful, we often, without misrepresentation, relate the whole as memory. What takes place thus in many cases consciously, takes place in other cases unconsciously. So strong is the imaging tendency of the mind that we make the tale of memory complete by appropriately filling in the gaps with part images. These piecings fit in so well that they partake of the general recognition of the whole memory. There is thus much of what we call imagination in the narrower sense, or simple imaging, in that especial cognitive form of imaging which we call memory. It must be remembered, too, that memories are never complete reproductions of past experiences, but partial, on account of the play of the interest and attention at the time of perception, and the interest predominant at the time of revival.

Memory depends, as we have seen, upon the association of ideas or images. But trains of imagery, not of the nature of memories, are also but successive associations of ideas. The question naturally arises, why are not our trains of imagery bound down in their appearance to the more commonplace behavior of memories, since both depend on the laws of the association of ideas, and these in turn rest upon so stable an affair as the habit of the brain centers. One might think that if the general power of imaging as seen in memory, in imagination, and in the trains of association, is dependent on brain habit, our associated ideas would be more complete, our memories entire copies of events as they happened, and our imaginations likewise but memory groups with no chance for variation.

It was found that in obtaining our sense experience, the mind does not receive, or at least attend to, more than a small fractional part of the possible impressions which may play upon the sense organs at any one time. Our perceptions, therefore, do not give us entire presentations of events as they happen in our environment, but only those portions which attract our attention and impress themselves upon us. Now these perception experiences make in some cases but a slight impression on the brain centers, while in other cases the impression is intense enough to be retained. The impressions thus fade in part and remain in part, and we are left with parts of experiences, many of which may be so isolated that they cannot be, when reproduced, recognitive memories. They thus become mere images. Not only is this true in the case of involuntary attention, but many sense-perceptions are attended to actively in parts, and thus there is a breaking up of the experience. We thus get more free images, which are in a way representations of our sense experiences but are not memories in the

sense of being recognized. Now when ideas and images are called up at any time according to the laws of association, based on neural habit, we get in some cases very full memories of past events, more partial or inadequate memories of other events, or we get, perhaps, series of images that have been, in the wear and tear of experience, freed from their original contexts in perception.

These free images, completely dissevered from their contexts, and other images selected by the attention from real memories, constitute the material for the work of the mind in forming its various imaginative products. There may, then, be free and uncontrolled play of imagery of the passive or reproductive sort according to the mood and interest of the moment. Or there may be the controlled play of images which we have in the active or productive imagination process, — controlled, that is, by the interests of the time and the end in view in the imaging. There is no reason to suppose that in either case the play of images and ideas is away from the control of the general laws of association. These laws rather make these forms of imagination possible, as well as in other cases providing for genuine memories.

The culture of the imagination. Popular speech is apt to be misleading when it makes use of such expressions as “the imagination” and “the power of imagination.” These phrases are in keeping with a view of the mind no longer tenable. They are but abstract ways of speaking of the concrete images and of the mind’s functioning in the way of imaging. Scientifically it would be better to speak of the development and training of imagery than of the culture of the imagination. When the more popular phrases are used they should be interpreted in terms of the concrete images, the actual conscious processes. The power of imagination is, as has been pointed out, a natural endowment. Its

proper training consists neither in developing it at the expense of other powers, nor in repressing it. Its proper place in the developing mind should be kept in view, and also the part it plays in the educated adult mind. Like all natural tendencies it should be allowed to develop, and that development should be given every opportunity to take place in a wholesome and useful way. The very fact that the imagination plays such a part in the lives of young children indicates that it has a great meaning for the child's development. Its different stages or ways of development represent different stages or processes in the growth of the child's total life, his ideas, his interests, his acts. The stage of seeming utter confusion with fact, of playing with dolls, of fairy tales, of hero tales, of dreams of even fantastic achievement,—all these have their places, and, if well-used, encouraged, and trained, mean great things for the child's life at the time and for his more developed career.

The sources of images. It has already been made clear that all images must originally come to the mind by means of the sense organs. In order that there may be an abundance of images, there must be an interested and extensive experience with the world of objects. This has been insisted on sufficiently in discussing observation. What is valuable for the one is valuable for the other. The abundance and exactness of observations will live in the mind as the abundance and exactness of images. To have many images, and these of an exact sort, is to give the imagination a chance for its normal growth. It is not only in the direct perception of objects, however, that imaginative material may be derived, though all images must directly or indirectly be derived from sense. By all the ways of getting information, by reading, study, etc., images may spring up in the mind that may be of as great use as those directly

derived by observation. Images that may have great use in all the ways of thought and action may come from unexpected sources. Observation of things and people, reading about people and their doings, about things and their properties, in literature, history, biography, geography, the natural sciences, — all such ways of gaining knowledge in an interested and attentive way increase the material out of which the imagination may build its constructions.

Development of imagination by use. The power of imagining is not exceptional in that it develops by use. The ability to see objects no longer present to sense may gradually become greater as they are, time and time again, imaged by the mind, as to color, form, number, position, etc. So with respect to tones and other images. No doubt, as was pointed out above, people differ in their natural abilities along these lines; but any one may, by using, for example, what visualizing power he has, develop the clearness of his images to a great extent. Continual practice may thus not only give greater exactness to one's elementary images, but may also increase their number, and thus provide for a richer development of the life of imagination in its more complex forms.

It is not only in the matter of obtaining elementary images that the teacher may be of assistance to the pupil; the processes of constructive imagery may be assisted and encouraged. Here, too, the royal road is along the lines of practice.

Nowhere is this more clearly seen than in the case of the work in composition, either oral or written. There is first the word or language side of the exercise. A word imagery for speaking or writing, that is ready, versatile, and accurate, is a most valuable possession. This cannot be obtained merely by reading and listening, though these are necessary.

It is by constant use, by continued and varied practice, that these forms of imagery are developed in a constructive, effective way. Constant expression in speech and writing is not second in importance to acquaintance with the speech and writing of others for the formation of a free, varied, and effective word imagery. Suitable criticism and encouragement here find a rich reward in the proper development of the pupil's powers.

But the proper development of word imagery is only one side of the case in such exercises. The hearing and reading of fairy tales, mythological accounts, hero and adventure stories, and descriptions and æsthetic appreciations of objects of nature, naturally lead the child to make such tales and descriptions for himself. Some children are much more imaginative than others, especially in these matters, but all take to it in a measure under the proper encouragement. Some may show more æsthetic appreciation of nature than others; some may find an especial interest in working out suggestions started by close observation of some work of art; some in heroic and even fantastic deeds of men and women, boys and girls, fairies and angels; some in descriptions of things around them; some in simple ethical and social relations, assistance in the time of need, and the like; some in matters of very practical account; some in several of these interwoven. In speech or in writing these matters may be set forth. Constant practice in such ways will lead to a development along the lines of knowledge, æsthetic appreciation, and practical endeavor, that could probably not be reached by any other means.

The cultivation of the imagination may thus reach out to all the conscious activities of the child. In great measure it may be correlated with the development of word imagery in speech and writing, as has just been pointed out. There

are, however, other ways of expression besides these which may be used to advantage. In drawing, color work, in the various ways of construction in manual training, in conduct and in feeling attitudes toward others, still further scope is given. We are speaking here of the ways of development of the imaginative powers which may be largely controlled by the teacher, and where results may be seen and estimated. The imagination of the child is, however, constantly at work in regions which are more or less beyond the reach of teachers and parents, in ways which cannot well be controlled nor the results estimated. In such ranges of the child's life he is quite alone, and the teacher can only be of use in an indirect way, in the providing of books, pictures, toys, and machines, and in example and suggestions, criticism and praise.

Appreciation and action as results of development of imagery. In the culture of the active imagination two features of the result may be kept in mind. The first is that of appreciation. If the child is developing along imaginative lines, whatever he sees, hears, and reads about, will mean much more to him than if he does not so develop. He will have an abundance of free images with which he may interpret what he comes in contact with. He may indeed misinterpret, or put more into a situation than it will bear, but he will not err on the side of noninterested stolidity. He will read his history, biography, and literature with more readiness and sympathy. He will see more in the behavior of the things around him, natural objects, machinery, and mechanical processes. The doings of people in his environment will be full of suggestiveness. He will have greater understanding of and finer feeling for the beautiful in nature and art than if his imaginative powers were dormant. In all these ways of appreciation the life of the child will

develop. There may be need of revision, or even of fuller growth of these appreciations, but this will come in time.

The second and even more important feature of the result may be called that of action. Here the use of the imagination and its cultivation is perhaps more apparent. It is decidedly useful, though its complete use can only be seen when the development of the sentiments, and especially of thought and action, are taken into the account. Take the imagination as scientific. Here the child's imaginative pictures are his guesses, his hypotheses as to what is the real nature of things. These make for him a lever with which to pry open nature's secrets. They tell him what to look for. They give point to his inquiry. Without these he is not very curious, or his curiosity is a very vague affair. He imagines, he tests, and finds out. What more does the great scientist do? The play of images and what these imaginings lead to are of a piece in the child and in the investigator. The teacher's task is, as is well enough known, not so much the supplying of information, as it is the prompting toward inquiry. This is the work of the imagination; and the child's knowledge grows as he is driven on to make his inquiries and to test his imaginative guesses. In æsthetic lines the appreciative phase of the result of the cultivation of the imagination may be more apparent than the active; but even here, whatever the child comes to do in an artistic way is made possible in great measure by his imaginative development.

In the life of action along practical lines the results of the development of the imagination are everywhere apparent. By means of his images he enters into practical relations with people and things. He may make mistakes in these activities, but he is prepared to substitute other ways of behavior to correct the first. He dreams, he plans, he

tries his plans, and, in so far as he dreams aright, he succeeds. Without his dreams he would be the slave of mechanical habit, and no real progress would be possible for him. As this is true in his more practical affairs, so it is true of his social and civic activities. New meanings, bearings, and possibilities are suggested to him. Perhaps nine out of ten of his dreams will not work, but the tenth may bring to him a measure of success impossible, except by accident, to the unimaginative man. In the higher ranges of his practical life which we call moral, his ideals of conduct, his sympathies, his thoughts of personal and social reform are made possible by means of an active, well-trained imagination. These images give him his suggestions, his material to work upon, his hypotheses to be tested by his further life activities.

As was brought out in the discussion of the association of ideas, material — images of a rich and varied sort — is a necessity for the further development of the life of thought and action. This suggests two features of the case which should not be lost sight of. The first is that the life of imagination is not itself the highest development of mind. A rich and well-developed imagery is essential, but chiefly as means, not as end. Imagery must be tested and made subservient to the life of thought and reason. How this is done will appear later. Imagery makes possible a life of action, not of the mechanical, routine type, but of the genuinely progressive sort. Simply to have images is not the main purpose of the life of imagination, but to have such an abundance of images of the right sort and so arranged that the further life of thought and action may be best developed by their means is the important feature in the case, although its significance is sometimes overlooked.

The second feature suggested is that there may be a luxuriant development of the imagination which is thought of as entirely an end in itself. This is overdoing a good matter. In this case the individual lives in an imaginary world, is satisfied with imagery simply for its own sake, and loses sight of the proper employment of images. The child's imagination should be encouraged, but it should also be cultivated and used so that it may come to real fruitage in the life of the boy and man. It is not enough that it should be merely in continual flower of purely imaginative forms. This would be abnormal. It takes its place in the normal life when it is healthy and strong, when it satisfies the soul with its forms, and when it makes possible the attainment of truth by means of thinking, and helps to achieve ends that are good and useful in the active endeavors of men. These matters will be brought out further in later chapters.

REFERENCES

- ROYCE. Outlines of Psychology, Chapter VI.
 THORNDIKE. Elements of Psychology, Section 9.
 SULLY. The Human Mind, Vol. I, pp. 278-294.
 HALLECK. Education of the Central Nervous System, Chapter IX.
 SEASHORE: Elementary Experiments in Psychology, Chapter IX.

CHAPTER XII

THE IDEATIONAL PROCESSES: CONCEPTION AND THOUGHT

The story of the mind as a knowing agent is not completed with the account of sensation, perception, memory, imagination, attention, and association. In addition to these and in conjunction with them there is involved conception and the process of thinking. This further activity of the cognitive mental processes is usually discussed under the three topics, conception, judgment, and reasoning. This division is somewhat arbitrary, as will appear in the discussion, but it will suffice for a starting point.

The concept. In attempting to understand the psychology of the concept or conception, two questions may be asked. The first one is, What is the nature of the concept as a mental experience? The second one is, How does the concept originate and develop? When these questions have been answered it will remain to inquire as to the relation between the concept and judgment, and as to the use of the concept in the reasoning process.

One may have a perception of the house at which he is looking, and afterwards may have a memory of it, — that is, a memory image corresponding to his perception. He may have associated this house in his mind with the other houses adjoining it. A builder may plan a house and have it definitely in his mind in imagination before the house is constructed. These are all concrete experiences of individual houses. What do we have in mind when we refer to house

in general ; when we think or speak, not of any house in particular, but of the general notion or concept "house" ? Or take any other general term, such as horse, tree, or triangle. These words represent general notions or concepts. What are the mental experiences corresponding to them, and how do such experiences differ from perceptions, memories, or imaginations of individual concrete things ?

The symbolic imagery and the meaning. It is not likely that introspection would reveal in any two minds exactly the same image or set of images corresponding to any one of these general notions. For one person, as we found to be the case in memory and imagination, the outlines and color would be very much more definite than for another. Again, for one person a certain more or less definite image might persist in the mind, while for another this image might change more or less quickly and there would be a succession of images. For example, in using the general term triangle, one might have in mind a certain triangle as it would look on the blackboard, or one might have a succession of triangle images of many shapes and sizes, on the blackboard, in a book, or elsewhere. The term "horse" might, when used of this class of animals, suggest to one person a definite image of a large bay horse ; while another might have flit through his mind many images, more or less definite, of horses of different colors and of different sizes. And so with respect to the general notion of house, tree, or any other thing. The imagery, then, connected with the use of the general notion is quite variable. It may not be the same in any two minds, and may differ in the mind of the same person at different times. The truth of this statement any student or class may easily make test of. The explanation of the variations in the different individuals may readily be accounted for according to the principles of association.

But is there nothing more to the concept than this variable imagery? If not, the concept is nothing but a memory image, imagination, or associated group of images. Though the imagery is variable and of the sort described above, it may be said that we all *mean* practically the same thing by the general notions horse, house, tree, or triangle. That is, any general notion has practically the same qualities for us all if we are tolerably familiar with the class of objects concerned. And further, this variable imagery stands quite as well in one case as in another for those qualities which the general notion contains. The individual image of house, more or less definite in the mind, has a reference beyond itself to all that "house" may stand for in the way of house experience. It is a place to go into, a place in which to live, a place to see friends, a place to eat and sleep, etc. These meanings are largely, then, in terms of action, so that practically the concept is composed of the chance house imaging which may be in the mind, and thoughts about actions which belong with that kind of thing.

Two features of the concept must, then, be distinguished, — the psychological imagery or the symbol, and that for which the imagery or symbol stands, namely the qualities or meaning of the general class notion, which is largely in terms of possibilities of various activities. In experiencing this imagery as indicating the concept, we have a feeling that any other imagery of a similar sort would have done just as well. That the proper meaning should be in mind is the important thing, — important, that is, for our practical purposes.

The concept or general notion, then, differs from memory images or imaginations not so much on account of the imagery in the conscious content, as in its further reference to the meaning suggested by the symbolic imagery. In using the concept in thinking, as we shall see more fully later, we

are not conscious of all the qualities for which the symbolic imagery may stand; but that quality or set of qualities is prominent which suits the practical necessity of the moment.

In connection with this imagery the consciousness of the word by which we indicate the concept occupies a more or less important place. This place will be more prominent with some than with others. Some will have an idea of its sound when spoken, others an image of how it looks when printed or written. In our more abstract ideas, such as truth, justice, or beauty, the word usually occupies a comparatively prominent place with respect to the rest of the imagery. It is decidedly more pronounced here than in such cases as the ones mentioned earlier, — horse, house, tree, etc. In fact, in the most abstract concepts it may be in some cases the only image present to the mind.

In answer to the question, then, as to the nature of the concept as a mental experience, it has been found:

1. That the concept consists of two parts, — the symbolic imagery and the qualities or meaning for which this symbolic imagery stands.

2. That the meaning of the concept is the thing of greatest importance, and that this is practically the same in each especial connection for those who are fairly familiar with the class of objects to which the term refers.

3. That the symbolic imagery may be more or less definite, more or less changing, and very different for different people.

4. That the general idea differs from a particular memory or associated group of images in that the general idea has a general rather than a concrete individual reference.

5. That the image of the written or spoken word is usually present as a part of the symbolic imagery, and becomes practically the sole imagery as the general notion gets more and more abstract in its nature.

Origin and growth of concepts. Now that the nature of conception as a mental process or experience has been described, the second question must be discussed, namely, the origin and development of the concept in mental experience. It may be said in general that it grows up out of sense experience and memory images; that it thus depends absolutely upon sense experiences for its existence, and that it is in a way composed of them. Let us examine how this takes place.

Sense-perceptions, more or less definite, of individual objects must be first experienced before the mind develops class concepts and becomes aware of them. The child's early experience of house, man, tree, are perceptions of individuals, more or less definite; but already, in getting these, the class notions are sprouting. Very soon, however, more houses, more men, more trees are seen. The different trees are not just alike, nor are the houses, nor the men. Yet each is called house, man, tree, as the case may be. The name becomes in a measure a guide in the development of the general notion, and the growth of the concept goes on. Instead of saying that perceptions come before concepts in experience, it would probably be more correct to say that they develop together. Early sense experience, as has already been pointed out, develops into definite sensations and perceptions. So, too, it might be said that it develops into perceptions of individual objects, and into general notions. The individual reference — that is, the perception — probably becomes definite in consciousness before the general notion gets the same degree of definiteness.

In the first place the mind has a tendency to use its earliest important experience in a double way: as a perception of the individual, and as a means for understanding other similar experiences. That is to say, the mind lets

the individual idea stand for a certain kind of experience. This early idea is taken and used in the world of action. If the idea works successfully wherever tried, there is no necessity for its modification. If it leads one into trouble, then the new experience modifies the idea, changing it so that it will work. It is in the world of action that early experiences become molded into useful concepts. As these other experiences come to the mind there results a complex process of the following sort: the original perception is kept in the mind as a memory image and is unconsciously compared with one or more new experiences of similar objects, or those going by the same name. This experience results in a finding of certain features or qualities common to all the objects, while other qualities are perhaps found but once. The mind is thus, without knowing it, comparing its varied similar experiences — those objects going by the same name — with one another.

While this is going on, the attention is drawn more and more to the common features, and fails to be attracted by the unimportant or infrequent aspects of these experiences. The result is an abstraction by the mind of those features which are frequent and important.

In this there may be a genuine breaking up or analysis of the different experiences. The attention is drawn to the common features and dwells upon them. Others fail to appear, and if new ones are somewhat noticed, the attention is not drawn very strongly to them, and they do not arise frequently enough to be carried along in memory. Experiences of objects are analyzed by the action of the attention as the mind proceeds to understand and master them.

At the same time the synthetic activity of the movement of the attention is going on. The mind is getting those features of its experiences of objects of a certain sort which

are constantly attended to in the perceptions, united or associated more firmly. The associating process is constantly going on. Thus the features seldom experienced and of little importance for the child are gradually dropped. The frequent and important ones are fused or associated into a unit. The work is one of synthesis of these qualities, as well as one of analysis of the concrete experiences as they occur.

Certain aspects of this process of arriving at the concept may then be noticed.

1. There is the tendency of the mind to use an individual experience to understand others similar and to stand as a symbol of that sort of experience. The child's first sight of a church, for example, will be a perception which will serve as a basis on which may be built his lasting concept of such a building.

2. The idea resulting from this first experience being tried out in practical activity in connection with new similar experiences, becomes so modified by this testing and comparison that it will work successfully in actually adjusting the psychophysical organism to the conditions of its life.

3. By means of the attention, the frequent and important features of similar perception experiences are naturally abstracted from the rest.

4. There is in this concept-forming process a genuine analysis of the individual perceptions by means of the play of the attention.

5. There results a synthesis of the frequent and important features of the experiences into a more or less stably associated group, — the concept itself.

This group of features or qualities — the result of this complex mental process — becomes for the individual his understanding or meaning of a certain class of experiences

commonly going by one name and term. They form the meaning of the mental concept so far as it is formed. It may grow in body, it may be clarified in meaning, by further perceptions and more careful discrimination; but the content of the concept will be determined by just these concrete experiences of the individual and by the mind working them up in the ways above mentioned.

The imagery which the individual will have in mind as the symbol of the concept will depend upon many more or less accidental circumstances. The mental imagery may be a sort of composite photograph of a great many of the experiences out of which the meaning of the concept has been drawn. Whether this ever actually occurs or not is a matter of doubt. What is called such a composite image may be but a blurred, not well-visualized memory image of some individual experience. No doubt the first perception will sometimes persist as a fairly definite image through many experiences, and will continue to be the actual symbol, arising in mind when that class of objects is referred to. Very striking, important, or interesting perceptions will sometimes so force themselves upon the attention that they easily win the position of symbol for all the rest. A perception which occurs very frequently will sometimes make good its claim to represent its class. Very recent experiences will frequently stand as the symbolic imagery for a concept, because our memory of them remains bright. The name itself, written or spoken, will be a very persistent feature of the symbolic image, and may stand, as we have already seen, in extremely abstract concepts, as the greater and perhaps the only part of the symbol.

The nature of the symbolic imagery standing for the meaning of the concept in any case will depend upon many circumstances: (1) the tendency, probably, of the mind to

make a composite image as a symbol; (2) the first experience of the sort in question; (3) very striking, important, or interesting occurrences of the individual cases; (4) the frequency of the occurrence of one of the class; (5) the recency of the observation.

Thus does the concept grow up out of individual, concrete perception experiences and their memory images, in the double way of the *meaning* (or *content*) of the general notion and of the *symbolic imagery* which the mind economically uses to stand for that meaning or content. All the concepts which are developed in experience and knowledge go through some such process as that above outlined, whether these general notions are simple ones, such as tree, man, book, table, dish, or trout, or more abstract in their nature, such as time, cause, government, or truth. Concepts must be built out of sense experiences, out of or along with sense-perceptions of the individual objects. No other way seems possible.

Judgment and its relation to the concept. In understanding the general nature of the thinking process, the nature of judgment as a mental process and its relation to the concept must next be explained. It must not be expected, however, that judgment is anything radically different as mental activity from what has already appeared in our discussions. As a mental process it is simply a case of attention working in an analytic and a synthetic way with its material, the material being largely abstract, — that is to say, composed to a great extent of concepts.

For examples of judgment such simple statements as the following may be used: The grass is green. Lead is heavy. The heat of the sun melts the snow. Fruit is wholesome. Taking the concepts used in the subject terms of the above statements, it is easily seen that the predicate terms add

nothing new to one's knowledge. In each case the predicate term is simply one of the features or qualities of the concept which the subject term includes. The judgment is, then, so far simply a singling out of one of the features of the concept. The concept is neither more nor less than it was before. One of its features has been pointed out clearly, and this it is one of the functions of judgment to do. Even when the judgment is a statement of a new item of knowledge for the individual making it, and the concept is enlarged by the further property or quality, it is still a case of calling attention to a certain feature, new to be sure, of the concept or object concerning which the judgment is made. The judgment from this point of view differs from the concept only so far as the attention is drawn to one of the features of the concept, the fact of this feature's belonging to the concept being brought out and asserted. This may be called the analytic feature of judgment. It is one of the ways of the practical use of the concept.

From another point of view, judgment may be defined as the union of two concepts. Taking the examples mentioned above, the judgment makes a synthesis of the concepts which the subjects and the predicates respectively indicate. The mind in judging may be said to work more especially in this synthetic way when new features are being added to one's knowledge. But strictly speaking, all judgments are both analytic and synthetic, the stress of attention being now on one aspect, now on the other.

In judgment we either make explicit the meaning of the concept by drawing attention to one of its features, — the analytic activity of the attention, — or we consciously add a new feature to the concept, or add two concepts together, — the synthetic activity of the attention. The concept is thus

either explained or completed by the judgment, and to do this the mind actively attends to its concepts and their meaning.

From the earliest stages of mental life in the child this judging power of the mind is in exercise. The earliest discriminations of consciousness are the beginnings of judgments. Similar experiences, colors, tastes, sounds, etc. are put together, and the consciousness that they belong together is really judging. So the further consciousness that certain other experiences are unlike — that, for example, *this* taste is agreeable and *another* taste is not — is really a judgment in the making. When the conception is being built up out of individual sense experiences the attention is always at work, as we have seen, in a discriminating way, and we constantly judge certain qualities as belonging together. The ball with which the child plays is found to behave this way and that; these movements are associated and stated, or at least treated, as if belonging together. This is judging. So in the matter of finding out the properties of apple, house, spoon, etc. Judgment is thus constantly in use in the making of the concept, and is at any one time a statement that a certain feature belongs to that concept or kind of thing, or that certain qualities belong together. The judgment and the concept thus grow up together in the conscious life, and it would be as useless as it is difficult to say which springs up first. Out of the early, vague sense experience of the child there gradually develop into clearness those mental processes which we call sensations, percepts, concepts, judgments, etc. The attention is, in its ways of analysis and synthesis, assimilation and interpretation, ever at work making the various mental processes stand out in clearness that they may mean more for knowledge and as guides to action.

Judgment as an analytic mental experience may then be described as a concept with the attention drawn explicitly to one of its features ; or, synthetically, as the union of this singled-out feature or predicate concept with the subject concept. This feature is always singled out for some practical purpose of thought or action. The use of this singling out and judging will appear more plainly as we study further the nature of the thinking process in reasoning.

The reasoning process. Reasoning is, of course, carried on by means of ideas. When we reason, we use memory images individual or associated, imaginings, and concepts. Judgment is also involved. What is the specific nature of reasoning as a mental process ? How does it differ from the mere association of ideas ? What is the use of the concept, imagery, and meaning in the reasoning process ? Such are the psychological questions which ought to be considered.

The practical nature of reasoning. Reasoning is always carried on for some purpose. The answer to the problem in arithmetic, the solution of the geometry exercise,—these are ends to be thought out. The manager of a political campaign must so think out the situation as to lead, if possible, to the success of his candidates. That is the purpose of his thought. The botanist examines his specimens and tries to think out the laws governing the development of the plants. The parents think out the expenses of their family so as to get the best results in the way of clothing, food, recreation, schooling, etc., and still keep within their income. There is a definite purpose in the thinking in each of these cases. The various items of one's knowledge, perceptions, memories, groups of associated ideas, concepts in any way connected with the subject under consideration, and even interruptions and irrelevant matters may come up, but in all this there is a choosing and a using of ideas

which one hopes will solve the problem that one is interested in solving. For there is some interest in the solution, no matter of what nature the problem is. One desires more or less strongly to get the matter thought out and settled. Some importance for the reasoner attaches to each line of reasoning. This importance may be very slight or it may be a life-and-death matter. The reasoning is carried on for a purpose.

The material used in reasoning. When any problem arises that is to be reasoned out and solved, certain ideas concerning the problem are already, of course, in the mind. The problem may be with respect to objects which one can perceive, as the botanist's specimens; it may be with respect to something remembered or imagined, as in the case of the anxious political manager or the solicitous parents. It may be some problem with respect to a concept or set of concepts, as in the case of the geometry exercise. Now the ideas of the present situation immediately in mind, and the ideas, more or less vague, about the purpose of the thinking, will, of course, suggest other ideas according to the laws of association. We have, then, perhaps a few, perhaps a flood, of associated groups of ideas. We may thus have hardly an idea to help on in the thinking, or we may be confused with the rush. Our habitual thought associations will determine, at first, the trend of our ideas. If the problem to be solved is of a familiar sort, the solution may be quickly arrived at by some habitual association. For instance, the solving of a problem in arithmetic with whose sort we are extremely familiar, or the expenditure of a week's income in the customary week-in and week-out way. Such a process could hardly be called reasoning. But even when the problem is a new one, when the solution does not come easily and we have to wrestle with it for a long while, we

cannot get away from what we can perceive, remember, imagine, or conceive. The material for our reasoning consists of those ideas which come up by association, suggested by our present thought of the situation and its problem and of the end to be reached. Follow out in thought some such case as one of those mentioned in the last section and the truth of this statement will be evident. We cannot think or reason without ideas, and the possession of these ideas depends upon our associations with the matter in hand. The value of the reasoning will depend in great measure upon the wealth of observations, memories, associations, imaginations, concepts, which one has, and upon their readiness to come to mind when needed.

Reasoning compared with association. Reasoning, however, is not merely a matter of associated ideas. Many of the ideas suggested are useless for the purpose in view. These are neglected and the right ones chosen. Much so-called thinking or reasoning is simply a succession of associated ideas, memories, imaginations, concrete mental pictures. Much conversation goes along such lines. One thing is suggested by another, and the talk goes on without any especial point or purpose, beyond passing away the time. In such reverie and such talk we all indulge. Often, too, when people try to reason or believe they are reasoning, they are simply going the rounds of their habitual associations, and so solve no new problems and reason out no new conclusions. Often pupils in school, in answer to a question, will give utterance to some statement suggested by the question along the lines of their mental associations and interests. In such a case the teacher often thinks, "That is true, of course, but what has it to do with the case?"

In order to reason, those ideas must be chosen which will be of use. When an idea is presented to the mind it

has to be examined carefully to test its bearing upon the point at issue. Will it be a direct step to the end to be reached? Will it bring the solution any nearer? Without this careful weighing and testing of the suggested ideas, the mind goes off on many sidetracks and the problem is not solved. In working out an exercise in geometry the conditions of the problem are set down, and the point to be proved clearly set forth. Here the choice of ideas is decidedly narrowed down. A hundred ideas of many things coming possibly to mind at the time are easily dismissed as irrelevant. Suppose one is given up to the problem. The conditions of the problem and the point to be proved suggest other ideas and features of problems which have been solved by previous work. Yet many blind trails invite one, and careful testing is necessary that they may be avoided, or abandoned when once chosen. But the promising features of the case are seized upon; these suggest further ideas; these in turn are tested and sifted, and finally the problem is solved. The testing of the suggested ideas, by the starting point and by the desired goal, is that which is the real difference between reasoning and simple association.

The use of the concept in reasoning. In the process of testing spoken of in the preceding section, something further is involved, and here comes in the use of the concept in reasoning. It is not enough to perceive an object, or to have called to mind the memory of it, or to call up by association other things or people in connection with it. Such mental processes are not reasoning. As we have seen, there is a definite purpose in reasoning, and any object presented in perception or brought up by association has to be examined with this end in view. A breeze is coming in through the open window and disturbs the papers on

my desk. My eye runs over the objects on the desk and an inkwell is espied. That will do to hold the paper down. Not much thought is involved in the case, but the essence of reasoning is there. The end in view is the holding down of the papers. The inkwell is thought of as possessing a property — weight — which will serve the purpose. That is my present way of looking at or conceiving the inkwell. The concept “weight” is the important link in the chain of reasoning. Weight is needed to hold down the paper; weight is a quality of the inkwell. The testing of perceived objects, or of associated ones, in order to see whether or not they will solve or help to solve the problem to be reasoned out, is simply a matter of being able to pick out the right feature, to find the proper concept, to look at things in a fruitful way for our purpose, — in other words, to see the point. In order to reason well, one must be keen enough to see the point, the concept, the property or feature in one of many perceptions or suggested associations that will work. Of a complex object which we can perceive, remember, or imagine, this feature or property is important for one purpose; that, for another. To use an example of James’s: “A man is such a complex fact. But out of the complexity all that an army commissary picks out as important for his purposes is his property of eating so many pounds a day; the general, of marching so many miles; the chairmaker, of having such a shape; the orator, of responding to such and such feelings; the theater-manager, of being willing to pay just such a price, and no more, for an evening’s amusement. Each of these persons singles out the particular side of the entire man which has a bearing on *his* concerns, and not till this side is distinctly and separately conceived can the proper practical conclusions *for that reasoner* be drawn; and when they are drawn the

man's other attributes may be ignored." This is the use of the concept in reasoning. It is used in place of the whole object perceived or associated, and is the vital feature of the process in solving the problem in hand. In this way, we may add to the doctrine of the preceding section, does reasoning differ from the mere having of a stream of associated ideas.

Attention and the reasoning process. In Chapter VIII, in discussing the nature of attention it was said that, in giving attention to a problem, the problem to be solved is the general object of the attention, while the particular objects of the attention, moment by moment, will be the various features or aspects of the problem as they present themselves. It was also said in the same connection that the work of the attention was constantly one of analysis and discrimination, and also one of making a unit of the analyzed parts, or of some of them. These features of attention are decidedly in evidence in reasoning. The attention is given to the problem and also to the associated ideas which are suggested as we think the matter over. This is analysis and discrimination of the various associations that come up. There is a concentration of the attention on the vital points of the progress towards the solution of the problem. The attention plays between the associated material offered and the end to be reached. The irrelevant material is thrust out of the consideration, is neglected by the attention, after examination perhaps, and the relevant material, the promising objects, and especially such of their properties as can be used, are fused together. The solved problem represents the synthetic activity of the attention.

Training and development of the thought processes. Training in observation, memory, and imagination is but preparatory to the further development of the processes

of knowledge in the activity of thinking, using the term "thinking" to indicate conception, judgment, and reasoning. The general nature of the thought process in conception, judgment, and reasoning, has just been discussed. We must now inquire into the nature of whatever training may be possible in the development of the art of thinking.

To what extent can the teacher take into account the thinking processes described in this chapter? How best can the processes of conception, judgment, and reasoning be utilized and developed? What part do they play in education? In general, we have it said that people must think well in order to understand the subjects of knowledge; and again, that one's training is of little value unless it has given one the power to think correctly. We must consider, then, both the ends to be achieved by school training in the matter of conception, judgment, and reasoning, and the most efficient means for reaching those ends.

To take up first the matter of training in connection with the forming of concepts. The forming of an adequate and accurate body of concepts is one of the chief aims of education. When we consider, however, that the purpose of knowledge is, from one point of view, effective conduct, and further, that the meaning of concepts is found for the most part in terms of possible action, we see that this aim of forming an adequate and accurate body of concepts is but an essential means to an end, — the end being defined in terms of conduct. But in any case that education is certainly faulty which leaves one with a meager and ill-defined set of concepts. In order that one's knowledge may be full, accurate, and practical, one's concepts of all features of experience must be of just this sort. In fact, what we commonly mean by one's knowledge is one's series of concepts.

In any subject studied, the great aim from a knowledge point of view is the acquirement of adequate and accurate concepts in that subject; for example, in arithmetic, the nature of percentage and interest; in physical geography, the meaning of watershed and valley; in physiology, the nature of respiration and digestion; and so on. What is being aimed at in all the school subjects is just the building of these general concepts so that they will be true or accurate, abundant or adequate for knowledge, and such as can be used or applied to the practical affairs of living.

We have discussed the general way in which concepts are formed. It has been pointed out in several connections that our general ideas or concepts must be based upon sense experience, observation. By general idea or concept we may mean the nature of some quality, such as opaqueness or elasticity; a general rule of procedure, as the rules for pointing off in decimals or for sailing a yacht; or the nature of some class of objects, as a seaport, a cotton plantation, the printing press, the solar system, a republic, a monarchy, etc. We have learned that we must come to these general notions or concepts in connection with perceiving, noticing, observing individual cases. Out of these observations grows the concept. Hence the first care in all study is to make wide and accurate observations.

Definitions and rules that are not understood in terms of previous observation of individual cases are simply words to be memorized and not material for real knowledge. It is a topic for especial method in the various subjects studied to point out just what features shall come first and what succeed. But if the account given above of the development of concepts is true, the principle of basing concepts and their statement on observation of individual cases is a valid one. By one means or another, study of the

individual happenings, objects, etc., is the one sure foundation for the further development of the general truths or concepts.

While the observation of individual examples is going on, and afterwards in memory, there results naturally, as we have seen, a comparison of the cases. This may take place involuntarily, or it may be active intended discrimination. Objects which go by the same name are seen to possess features in common and features which are unlike. Soon there is a distinction made between the regular features and those which vary. Certain features come, as we have seen, to stand as the meaning of the concept. Other features are but the chance imagery, the symbol of that for which the concept stands. Now, in any active attentive study of a topic, this feature of comparing, of getting the essential features of the thing separated from the nonessential, is of great importance. Wide observation, while a necessary foundation, is not sufficient for the formation of the concept. The observation must develop in the process of comparison; many examples must be noticed and compared. When this is carefully done with the object of finding out the real nature of the matters examined, — that is, of discovering their meaning for the purpose of the investigation, — the next stage in the process stands out very clearly.

Those features which seem to count, which are the common ones while others change, are noticed for themselves, are abstracted from the individual cases and set apart by themselves as the meaning of the concept, — the generalization of the cases in hand. This is the general rule, truth, concept, or principle, of which the student is in search. He wants to know what will work, what the significance is for action. This is the real meaning or purport of the cases he

has examined. The student is now ready to make a statement of the general principle, or the meaning of the cases as it has developed under his own observation, comparison, and abstraction or generalization.

In such a study of facts leading to a definition, rule, etc., it is well to use in great part those individual cases which we may call typical or good examples of the principle involved. In such instances the meaning stands out clearly, and the pupil is not misled into taking chance imagery or unimportant details for the main feature. Observation of the direct kind, or of the indirect sort of listening to or reading descriptions which can be understood in connection with these striking cases, will lessen decidedly the necessity of much comparison and will make the abstraction of the general truth a comparatively easy matter.

The next important feature of the development of the concept for the sake of knowledge is its testing. Will it, after all, fit all the cases? Is the definition accurate and adequate? Will the principle hold as stated? Will the rule in arithmetic, for example, solve the problems set? The importance of this feature can hardly be overemphasized. Here the truth of the general notion is tried. Its nature is more fully understood as it is used. It becomes a part of one's real knowledge as it is tested and related to the various features of the sort in one's experience.

This process of the development of the concept by observation, comparison, generalization, and application, is, in general, the royal road to those accurate, adequate, and practical truths to obtain which is a main object of study. It is a constant making of inductions and a testing of their validity. Any attempts to obtain concepts by any shorter road will probably be in vain. Statements of rules and general principles which are not understood by the learner

may as well not be made. They are often worse than useless, as they are likely to blind him to his ignorance. They are empty, meaningless affairs. There is no magic in words to carry over from teacher or book to student the real meaning of general truths by their bare statement, when the student has had no adequate observation experience to give such statements a filling and a meaning. Let the experience come first, and the statement of the general principle, definition, rule, etc., will be the next natural step, and will be understood. It will become a real part of his mental equipment and will be one of his tools for advancing him in knowledge and practice.

We may next take up training and development in connection with judgments. It was said above that judgment may be described in an analytic way as a concept with the attention drawn explicitly to one of its features, or in a synthetic way as adding a new feature to a concept, and that this feature is always singled out for some practical purpose of thought or action. This is done either by specifying some well-known feature of the concept or by adding some new feature. The development of concepts, then, means development of judgments. Knowledge grows, or our concepts grow, by this process of adding new features, or it may be by eliminating from the concept some feature which further comparison shows does not really belong there. Concepts are thus enlarged and clarified. To make valid judgments is of vital importance in the growth of knowledge, and to increase one's ability to make such judgments is one of the main objects of education. This making of judgments is an essential part of the individual's mental growth. It cannot be done for the student, because the truth sought to be conveyed would then be but an external association of words with the topic in hand, and would

not be a vital part of the growth in knowledge. As concepts grow up in all branches of study and in all parts of experience, so judgments are everywhere involved; training in the making of judgments becomes a means towards growth in knowledge, and ability to make such judgments grows with exercise.

Growth in knowledge involves the noticing and asserting that certain features in one's perception experience are alike, that they are of the same sort or kind. One's discrimination becomes finer the more it is exercised, so that one can detect resemblances and common features even in objects and events which at first sight seem far apart. To see and assert this likeness is an important feature of judging and an important factor in the development of concepts or general notions. This same attentive discrimination leads to the noticing of differences,—not only obvious ones, but also those which are cloaked by seeming likenesses in first perception. That certain objects, qualities, or events, shall be distinguished and kept apart, that they shall not be permitted to enter into the same concept, is an important feature of judging and an important factor in the growth of knowledge. That certain qualities belong together in a true estimate of one's experience, and that certain others do not belong together, is a principle that correct judging always brings forward in consciousness. To notice and assert that certain qualities belong in the concept watershed, relative pronoun, or zinc sulphate, that certain other properties do not belong with the qualities of each of these, is the judgment in exercise.

This process of judging is brought out strongly in the comparison phase of the development of the concept. To notice and assert this and that relation,—size, shape, duration, color, taste, weight, etc.,—to discriminate correctly

and to assert accordingly, is to make judgments, to enlarge and clarify concepts, and to promote the growth of one's knowledge.

There is no subject of study and investigation which does not involve for its correct learning these constant judgment processes. Knowledge thereby becomes accurate and complete, and the habit and the ability to judge grows with its exercise. There is a mental virility and independence about the student taught to judge for himself, which other people do not possess.

There are many dangers in the way of this development of valid judgment and the habit of correct judging. Vagueness of sense-perceptions and lack of apprehension of matters heard and read vitiate the process at its very beginning. To get clear, exact observations is to get the proper material to work upon. These observations must be extensive as well as exact, or the judgment will be inadequate and inexact for lack of material to work over in the mind. Hasty and superficial examination of facts gives no opportunity for exact discrimination and careful judging. Deliberateness in judging should be encouraged.

Haste goes along with preconceived notions and desires as to how the thing should be. Human nature is prone to jump at conclusions and to judge in accordance with its own interests. The student should be encouraged to be as impartial as possible in the matter of judging, in order that the higher purposes of knowledge and right action may be subserved. The statements of textbooks and the words and dicta of teachers and elders may be most valuable in themselves, but their value for any individual pupil consists in his own assimilation of them. They may be most harmful, if they stand in the way of that real advance in knowledge which can be made only by himself.

The normal development of knowledge is by means of genuine judgments. If subjects of study are carried on in this way, the general notions formed will be correct and adequate, the habit of independent judgment will be developed, and the student will possess a body of knowledge and a habit of judgment which will be what is meant by the ability to judge.

The third phase of the thought process, closely connected with conception and judgment, is that of reasoning. The problem presents itself, How can the student be helped to think for himself? And this means, How can he be encouraged to make valid concepts, to judge accurately, and, lastly, to reason independently and correctly? Or, in terms of the individual, how can he acquire and develop the habit and ability of doing just these things?

Reasoning is an inference, or a series of inferences. We have seen above in what the essence of reasoning consists. Logically, it is the exhibition of the grounds upon which the conclusion as a judgment rests. It is the picking out of the proper concept or property from a certain object or situation that will enable one to conceive that object in a new relation to some other object. It is the working over of concepts and judgments so that new relations between objects or properties are brought out and asserted in a further judgment. These general statements perhaps sum up what was brought out above as to the nature of reasoning. The practical problem remains.

The way in which one may attain the desirable ability and habit of reasoning independently and correctly, or with as much strength, sense, and acumen as his natural constitution will permit, is, of course, to keep everlastingly at it in the struggle to solve whatever problems arise in his own situations in life. In the first place, in helping the student,

the treatment of subjects in textbooks and the talks and explanations of teachers should be as far as possible reasoned accounts. The grounds for statements should be made plain in terms of what the student already knows. The connecting links in the reasoning should be made plain. The right way of conceiving the topic with respect to the end desired should be clearly set forth. Such precautions will tend to start the student along the line of right reasoning, there will be constant examples before him of right method and results, and he will be given material for further practice. In the next place, and even of greater importance, the statements of pupils should be closely scrutinized and challenged, in order that the steps may be taken not merely by the way of chance association of ideas but by the way of reasoning, or closely observed relations of facts as bearing upon the point at issue. This demand and correction on the part of the teacher and this constant effort on the part of the student should give a genuine development along the lines of well-reasoned knowledge.

In self-training the way to learn to reason is to reason. Constant practice will reveal to one that he must have knowledge or ideas for the material of his reasoning. Then comes the testing of these ideas for the solution of the problem in hand. Both of these features should be understood in terms of a definite aim or problem to reach or solve. Then comes in the sagacity to pick out just the feature of the experience, the concept, which will get one ahead. If these features of the thinking operation as described earlier in the chapter are understood, there will be an intelligent and efficient self-schooling on the part of the energetic student. He will get into the habit of judging and reasoning for himself. He will know that there is a difference between hearsay and the mere association of ideas on the one

hand, and genuine thinking on the other. He will appreciate in what the difference consists. It is not the training of a so-called reasoning faculty that should be directly aimed at. The value and place of reasoning in knowledge and life can be appreciated as a well-defined ideal. The reasoning processes may themselves be understood. A body of knowledge which has in its acquirement been thoroughly reasoned and understood may become the individual's possession. If the ideal of reasoning is clearly set up and deeply appreciated, if the reasoning process is understood, if by the toil of days and years a well-knit, well-reasoned and extensive body of knowledge along the main lines of human interest has been acquired, then will the student possess in his measure that much-to-be-desired quality, the power of reasoning.

REFERENCES

- THORNDIKE. Elements of Psychology, Sections 11-13, 48, 49.
THORNDIKE. Principles of Teaching, Chapter X.
TITCHENER. An Outline of Psychology, Sections 82-84.
JAMES. Psychology, Briefer Course, Chapter XXII.

CHAPTER XIII

THE COMPLEX AFFECTIVE PROCESSES: EMOTION AND SENTIMENT

Obvious features of emotion. Those states of mind which we call emotions are quite familiar. To mention fear, anger, love, or joy, is to call up at once something of the nature of these peculiar conscious states. The thought is at once suggested that they are essentially of the feeling sort of consciousness. The emotion is decidedly affective rather than cognitive in its nature. We take certain events or situations thus and so, and are affected by them in the way of fear, anger, love, or joy.

Emotions are, as a rule, very intense experiences. We are wonderfully stirred by them. We are swamped by their power. So intense are they that thought and action may be for the moment almost paralyzed, while to think and act properly under the circumstances the emotion must be brought under some control.

Again, emotions are natural or instinctive affairs. Our make-up is such that under certain circumstances it is practically impossible to escape this emotional stirring up. On sufficient provocation we are naturally angry, while in other circumstances we cannot repress our joy. So instinctive, natural, and inevitable are our emotions that we commonly speak of them as instincts, — the instinct of fear, the instinct of pride, etc.

Lastly, we may say that emotions are decidedly impulsive or driving in their nature. We naturally express our

emotions in certain characteristic ways. The emotions may be somewhat repressed, but the nature of emotion is to express itself in forcible conduct.

We may say, then, before we push our inquiry concerning the nature of the emotions further: (1) that they are essentially of the feeling sort of consciousness; (2) that they are very intense experiences; (3) that they are natural or instinctive ways of feeling and responding under the appropriate circumstances; and (4) that they are impulsive in their nature, or tend naturally to forcible expression.

Emotional situations. People are so constituted that when they are suddenly confronted with certain situations in perception, memory, or imagination, they undergo that state of consciousness which we call emotional; that is, they experience an emotion,—for example, fear during a thunder-storm, anger at a slighting remark, the outpouring of love, joy over a football victory, pride in the achievement of a brother, grief over the death of a friend. If one should see a neighbor's house on fire; should become excited and alarmed; should see, on arrival at the scene, that some members of the family are at the fourth-story windows frantically calling for aid; should realize that escape through the house in ordinary ways is impossible, that no ladders are near, that a jump would endanger life and limb, that the flames are getting nearer and nearer the room where the endangered ones are, and that fear reigns in the hearts of all, clear thinking would be most difficult and conflicting thoughts and acts would suggest themselves. At last the belated fire company arrives; skilled hands erect the ladders to the windows; the daring rescues take place; hope, admiration, relief, gratitude, and joy surge into the minds of the rescued and the spectators, and later gradually subside.

Suppose a case where a couple of boys have put off in a sailboat to make a five-mile trip across a bay. The sea is rough, the wind increases, the waves get higher and higher. A friend of the boys has seen them start, knows how amateurish is their skill in sailing. The friend's imagination will picture the possibilities of disaster in all details. A headland makes the boat no longer visible. Fear, suspense, even anguish may possess the friend's mind. An hour afterward the friend hears of their safe arrival on the other side of the bay. The emotional experiences change to relief and joy.

We might take a case of emotion connected with a memory. The act of heroism and of devotion may awaken emotions of admiration, love, and gratitude to an even greater extent in memory than when the deed was witnessed.

Mental factors in emotion. With these cases in mind the factors or mental constituents of the states of consciousness concerned may be picked out. The first, though not the most important, factor of an emotion is this basis in perception or image out of which the full emotion springs. The person is confronted by an incident or situation which he must respond to in some manner. This circumstance or situation thus suddenly brought to his attention is grasped in more or less detail. It probably is something which he sees or hears. The possible consequences to himself or to others at once suggest themselves. Or the incident may possibly be something suddenly called to memory by some present suggestion. Other associated ideas cluster around the suggested memory image. Such a situation in perception or memory, calculated to stir the individual in an emotional way, takes hold of him in a decidedly pleasant or unpleasant fashion. The second factor in the living of an emotion is, then, this strong affective toning, pleasant or

unpleasant, of the group of perceptions or memory images, together with associated suggestions, which give rise to the state. Taking these two factors together, we have as one great part of the emotional experience a strong feeling, natural under the circumstances mentioned.

But this is not all. We could not speak of an emotion as being more than a simple feeling were there not some additional factors. In fact, we have yet to find the main feature of the emotion, that which gives the state of mind its peculiar flavor, the feature which makes the state a decidedly emotional one. The experience takes a deeper hold of us than does a mere feeling.

When the situation calculated to stir up an emotion confronts the individual, he is deeply stirred. His whole being responds. He thrills with excitement. This means that the situation sets up in him certain physical changes. He cannot help having these instinctive physical responses. But at first he does not know definitely what to do. He tends to "fly to pieces." His movements are more or less meaningless, erratic, uncertain. The motor tendencies are apparently in conflict. They are not such as to lead to a quick and sure response which would enable him to master the situation.

The physical changes or stirrings of his bodily organism report themselves at once in consciousness. His stream of consciousness is decidedly modified by the inflow of the feeling of the motor conflict. He experiences a wealth of bodily feelings. These feelings have in them two factors, the organic sensations and their huge affective toning, pleasant or unpleasant. These are the third and fourth factors which enter into the make-up of the emotion. These rich, strong, organic feelings, joined with the feeling constituted by the first and second factors of the emotion, make up the entire

emotion. These organic feelings are very strong, showing that the individual is profoundly stirred. Hence the strength of the emotion. Without these, the emotion would be impossible. They are the great commotion in consciousness. They are the main, though not the only, factors in the emotion.

It would hardly be correct to say that we first feel the emotion and then express it. When we are confronted by a certain situation the body at once readjusts itself, changes taking place in various parts. The feeling of these changes as they occur is certainly the main characteristic feature of the emotion. If the emotion is freely expressed, it is intense but soon wears itself out, probably on account of the wearying of the nerve cells and the muscles concerned. If the emotion is repressed, and if outer manifestations, like weeping, laughing, or shouting with joy, are not indulged in, the emotion is likely to last longer, though it may not be so intense. The organic feelings in such a case arise from inner physical disturbances. The person may not show the emotion, but he feels it deeply "inside." On account of the repression of the tendencies to "explode," the physical changes are where they do not show. Without the feelings resulting from these organic changes the emotion would be a comparatively cold-blooded affair. As was said above, without these the experience would not be an emotion at all. The emotion and the physical expression, then, go on at the same time, being the mental and the physical sides, respectively, of the one occurrence. Of course the emotion may be rather deeply felt before the most outward manifestations, like striking in anger, are exhibited.

Expression of the emotion. One of the most noticeable features of the emotional life is its outward expression. Fear, anger, surprise, etc., all tend to express themselves

in a manner at once decided and characteristic. We do not usually mistake one state of emotion for another, nor do we as a rule fail to notice a change of expression in those about us when they become possessed by an emotion. Our friend is delighted with the good news he may receive; we notice his emotion. We also notice his overpowering grief when he receives most grievous news.

It would not be difficult to describe the more outward and apparent forms of manifestation of the various emotions. They are too well known, however, to require more than the merest mention. The bowed head and the sob of grief, the clenched fist of anger, the crouching form and the hair standing on end of fear, — such facts as these are of the commonest knowledge.

But we may go somewhat deeper than this.

1. The emotion takes a strong hold of the physical organism. The vital organs are modified in their action. The heart, the lungs, the stomach, the skin, the muscles, the salivary and other glands, and various other parts of the body undergo changes in their normal activity. These changes are, as we have already seen, reported in consciousness, and we call them the various sorts of organic feelings. Little more can be said about the reasons for these peculiar disturbances. They seem to be natural to the organism, and each form of emotion seems to have its own variety of physical disturbance.

2. In assigning further reasons for forms of emotional expression, we must remember that the organism has an inheritance from countless past generations. The various ways in which emotions are expressed may be, to a certain extent, useful to us now. They were much more useful, however, in the lower grades of development. The forms of expression are largely due to our inheritance of peculiar

activities once useful to the individual in dealing with the object of the emotion. For example, we raise the eyebrows and start when we are surprised. The lip is curled in the sneer, though this incipient snarl may, in us, have outlived its usefulness. So in great measure the peculiar expressions of anger, pride, etc.

3. Primitive man, on account of his limited vocabulary and the simple nature of his life, expressed his feelings, wishes, and emotions by gesture and by facial expression. He responded directly to pleasant and unpleasant experiences, tastes, smells, sights, and sounds. When other experiences came which affected him very much as these pleasant or unpleasant sensations did, primitive man would naturally express these more novel and more complex states of mind as he expressed himself concerning pleasant or unpleasant tastes, smells, etc. Our language bears this out in such expressions as "looking sour," "unsavory reputation," "a taste of success," and "a sweet memory." These phrases are evidence of this primitive method of expressing various sorts of feeling and emotion, and are the inheritance of the civilized man of to-day.

The chief principles of emotional expression may, then, be summarized as follows: (1) emotional expression is a natural, profound disturbance of important parts of the organism; (2) the expression is in a measure a survival in milder form of activities once extremely useful to the organism in facing the peculiar circumstances of its environment; (3) the expression may also be in a measure facial, inherited from a condition of life where such facial expression was the best means of conveying the meaning of certain experiences, — that is, those affecting the individual in the same manner as certain tastes, smells, sights, and sounds. The possibilities of expression under these three

heads are indefinitely many. Their various combinations give opportunity for all that richly varied life of emotion which the human being possesses.

Function of emotion. Some further light may be thrown upon the nature of emotion by a reference to its purpose and meaning in the life of the individual.

1. We are stirred emotionally only by such circumstances as affect our well-being. In surprise, fear, anger, etc., the circumstances are important ones and the arousal of the organism is instinctive. Events happening which have no connection with the person, or which can mean nothing of any importance to him directly or sympathetically, are not the sort to stir the emotions.

2. We are not stirred emotionally by those circumstances which we are accustomed to take care of in a habitual way. When habit takes care of the case, there is no need for an especial arousal.

The arousal of the self in an emotional way is an indication that a situation must be faced which requires different treatment from that which we are accustomed to exercise. We are, of course, excited, and in fact usually so much excited, at first, that we do not react in the most effective way. Temporarily — as, for example, in fear — we quiver with the stress of the emotion, but are practically paralyzed so far as any efficient action is concerned. Our old habits will not suffice; they do not fit the case. The mere excitement will not suffice. Unless the excitement, the arousal of the powers of the self, can issue in some sort of advantageous conduct in facing the circumstances giving rise to the emotion, it is practically useless. The natural course of events, however, is that the excitement leads to a rearrangement of our customary methods of behavior for the purpose of effective conduct. When this natural course goes on we

gradually steady down, get a measure of self-control; the inward commotion subsides somewhat; we desire a certain outcome and use our powers intelligently to obtain it. For this useful purpose the emotions exist. It is a stirring up of the powers of the self to act advantageously in the peculiar situation which gives rise to the emotion. The depth of the feeling indicates the importance of action in the case.

When the emotions are constantly called into exercise just for the sake of pleasurable excitement, they are abnormally called upon. The person who indulges in this sort of conduct in an extreme way we call sentimental. When lived naturally, however, the instinctive emotional life is of great importance and advantage. It is the index of a genuine arousal of the self to meet new circumstances effectively with all its available powers.

Sentiment. There is another class of feeling experiences, the higher or finer emotions, which are better called sentiments. They are aroused in the mind in connection with certain judgments, such as those of the beautiful, the tragic, of moral approval, patriotism, reverence, etc. They may be classified as follows:

1. *Æsthetic sentiments.* These are inspired by one's natural love of the beautiful.

2. *Moral sentiments.* These are aroused by situations and judgments of a moral sort, by one's tendency to love and admire the good in conduct, and condemn the bad.

3. *Social sentiments,* — love of country or patriotism.

4. *Religious sentiments,* — those naturally arising in one's consciousness in connection with the thought of the divine, and the relation of the human to the divine.

5. *Intellectual sentiments,* — those aroused by one's natural love of truth.

To explain in greater detail. The æsthetic sentiments may be aroused by many different objects. The beautiful in nature; the ugly or beautiful in form; the artistic in painting, sculpture, architecture, and music; beauty in literary production,—any of these may be, as they are experienced in the judgment of the individual, the basis of the æsthetic sentiments. The intellectual sentiments are usually experienced as love and admiration of the truth, leading one on to attain it, and feelings of fitness and satisfaction with its attainment. The moral sentiment may be experienced with respect to one's own conduct or to that of others. One has an experience of feeling of obligation to perform certain right lines of conduct, and also a feeling of self-approval or of remorse according as one has acted rightly or wrongly. Remorse may be so deep-set physically as to be called an emotion. One may experience, in the way of sentiment based on judgment, approval or disapproval with respect to the conduct of others. The social sentiments are aroused in connection with judgments about one's country, state, town, church, or society. These are closely connected with pride and sympathy, and generally go by the name of patriotic feelings. The religious sentiment takes on many forms, but is experienced in reverence for God, awe in his presence, submission, etc.

In analyzing the nature of sentiment as a mental state, it may be compared with emotion. In the first place it is aroused by some judgment in connection with the appropriate object, not merely by (as in the case of emotion) the awareness of a situation, or an associated group of memory images, or imaginations. In connection with the judgment concerning an object, there is a decided glow of pleasantness or unpleasantness immediately aroused. These two factors correspond to the first two factors of the emotion.

The normal human being is of such a nature that he has an instinctive bodily set with respect to these strongly affectively-toned judgments. He has a certain bodily stirring-up and expression. This is very mild indeed compared with that experienced in emotion, but it is doubtful if it is ever altogether absent. The third and fourth factors of the sentiment will then be certain organic sensations aroused by the attitude of the organism under the circumstances, together with the affective toning of these sensations, making a feeling which, with the feeling composed of the first two factors, constitutes the sentiment. Take, for example, the sentiment of reverence towards the Divine Being. Notice the characteristic posture, — the bowed head, the natural kneeling or standing position. These expressions enter decidedly into the make-up of the sentiment. One can hardly help feeling reverent under such circumstances, while it would be equally difficult to feel the sentiment of reverence sitting back in one's easy-chair, with feet higher than one's head, smoking a cigar or eating sweetmeats.

Compared with emotion, then, we may say that the sentiment is less intense because less composed of organic feelings, and of higher grade of mental life because it rests upon a judgment of ideal relations, rather than upon being confronted merely by a situation in perception. Like the emotion, the sentiment is an arousal of the self to act appropriately under certain circumstances.

It may be well to outline a little further the nature of one of the groups of sentiments, in order to come to a fuller understanding of what the feeling life expressed in sentiment is. Let us take for this purpose the moral sentiments, as they are probably of even greater importance than the others, if a comparison between mental processes of such worth can be made.

These sentiments are experienced by people in connection with judgments about the right and wrong in conduct of self and others. They are in a striking sense affective, there being intense satisfaction and dissatisfaction involved in them. When we approve or disapprove the moral conduct of ourselves or others, we do so feelingly. When faced by a moral situation, the feeling of "I ought," or "I ought not," is deep indeed. When we have performed the virtuous act in face of all obstacles and temptations, we have the delight of the approval of a good conscience. When we have failed, we have the decidedly unpleasant experience of remorse.

The factors involved in such experiences are the judgments which are made in the cases, the pleasantness or unpleasantness of the affair, and the organic feelings which come into consciousness on account of the set of the whole organism in such situations. These feelings are decidedly unique. It is difficult, if indeed possible, to analyze the feeling of oughtness any further.

It may be well to point out the fact that these sentiments grow up gradually. There are certain conditions which are favorable for their development, and a few of these may be indicated. First, there are the pleasant and unpleasant consequences of certain acts. Hence a premium or discount on such acts, as the case may be. For these acts the child is likely to receive praise or blame. Rewards and punishments are also likely to be his portion upon such performances. Hope of the one and fear of the other enter into his attitudes. Certain acts are suggested by parents and teachers, and have all the weight of authority connected with them. The child learns to obey, to fall in willingly with such and such lines of action. Then, by means of his social impulses, love and sympathy, he tends to perform

loving and sympathetic acts, backed by these feelings. He also tends to perform these acts because of his love and sympathy for those who are suggesting such acts to him.

Such conditions are constantly present in the child's life. Such instincts and emotions early influence his conduct. Without undertaking to go into the further question of how instinctive the moral sentiments themselves are, and without entering into any controversy as to the exact nature of the development of the child, from a condition where he is moved by just such instincts and considerations as those mentioned above to a condition where he is profoundly moved by moral sentiments and considerations, we may at least point out the following facts: Gradually, under the influence of the conditions dominant in early life leading to such results in conduct as those above mentioned, the moral sentiments and the moral judgments connected with these sentiments develop. This early instinctive and emotional life, where love and sympathy and fear are much in evidence; this susceptibility to pleasant and unpleasant consequences, to praise and blame, to reward and punishment; this time of response to suggestion of others, of copying the acts which will meet with social approval,—all these complex considerations of living, of feeling, learning, and doing, pave the way for the emergence of the moral sentiments. These moral sentiments come to act in conjunction with the earlier forces, and gradually, in great measure, purely by themselves.

The emotions and sentiments educationally and practically considered. It is not the business of education either to repress the life of emotion and sentiment, or to encourage its indiscriminate development. It must be utilized and trained. If it is unduly repressed, the person will lack in power. If unduly encouraged, the individual will become

overexcitable and sentimental. If allowed to run wild, the emotions would soon master the whole nature, and one would become a passionate weakling. If kept under control, and allowed to give momentum to the achievement of desirable ends, they become a priceless resource. It is possible for the sentiments to become sentimental vaporings, playing no essentially useful part in the life and development of their possessor. If properly trained, on the other hand, they may be most valuable allies in the development of knowledge along ideal lines, and in the molding of worthy character.

Results to be aimed at. In discussing the training of emotion and the feeling life generally, it will be well to keep in mind those general ends or results which the well-trained emotional and feeling life will bring about. These ends may be summed up in three general classes with which the reader is already familiar, — feeling experiences, knowing experiences, and active or willing experiences. The end to be brought about by the proper training of the feeling life may be summed up, in terms of feeling experience itself, as enjoyment or happiness. The end to be brought about, in terms of knowledge or intellectual activity, is the establishment of deep-set interests along intellectual lines so as to result in thorough, accurate, extensive, and useful knowledge. The third end, or class of ends, the active or willing experiences prompted by properly trained emotions, may be summed up as success and rectitude in action. In short, the emotional life should be so trained as to bring about in the individual an experience that is thoroughly happy and enjoyable, a set of interests prompting to intellectual achievement and progress, and a set of habits of action at once of rectitude and utility. These being the chief ends to be realized in the training of the feeling life, our problem

will be to find the best ways of dealing with the life of feeling, emotion, and sentiment, that the appropriate means may be adopted for the purpose.

Happiness as an aim. That life shall be as enjoyable and happy as possible is no longer regarded as an unworthy aim. This end is held to be not incompatible with the other aims spoken of above. To be happy has become a rational aim and a manifest obligation. The question arises as to the practical means by which, in self and others, this extremely desirable end may be realized.

In discussing the problem of the means to be employed so that the whole life of feeling may be trained for the highest results in the way of enjoyment, the whole range of feeling experience must be taken into account. Feeling or affective experience has been shown to embrace agreeable and disagreeable bodily and mental feelings; the emotions, such as fear, anger, pride, emulation, sympathy, love; and the sentiments, intellectual, æsthetic, social, moral, and religious. These all must be so cultivated that there will be no clashing of interests; that their exhibitions may be in due measure, in proper times and places, for the furtherance of real enjoyment and lasting happiness.

If by providing proper accommodations and surroundings, by example and reasoned precept and explanation, by proper instruction in physiology and hygiene, and by suggestion and encouragement in the matter of forming habits, teachers can promote health in their students, they have gone a long way toward promoting their lasting happiness. In this same connection it may be said that many forms of exercise and sport which will be of permanent value for recreation and health may easily, by suggestion, example, and proper opportunity, be made the habits of pupils. These, too, have their part in the general happiness of earlier and later days.

The health and general activity of the body having been encouraged and developed consistently in early school and home life, one condition of the enjoyment of life has been reasonably met. A healthy, strong mental life, on the other hand, is even a greater factor for achieving the result. The whole educative process is intended to produce a full, active, accurate body of ideas and well-developed interests. This has had sufficient recognition in the chapter on attention and interest, and is cited here to point out its direct value in education as a formal condition of enjoyment.

A great factor to be taken into account in the education of the feelings is the immense influence of social environment. Happiness is, as all know, largely a matter of attitude. If there is contentment in the atmosphere surrounding the child at home and in school, he will tend to be content. This does not mean lack of ambition, but a general healthy attitude toward one's conditions of life. This may be taught, indirectly for the most part, in all the years of school life. Feeling attitudes are contagious; they are matters of imitation quite as much as are mannerisms and ways of speech. Contentment thus becomes a habit which even a life of failures and misfortunes cannot overcome.

Another important feature of the training of the feelings in order that life may be enjoyable is the proper care and nurture of the æsthetic imagination and sentiment. This may be carried on during all the years of school life. Appreciation and enjoyment of the beautiful in nature and in the arts may be made the direct object of teaching and influence. Art productions may be gradually understood and enjoyed if the same care is given to these matters as to the teaching of arithmetic and geography. Especially may æsthetic appreciation be developed if the active

imagination of the child is encouraged to produce what it can in the way of the beautiful. Whether by imitation or in a more imaginative way, the child may be encouraged to do something for himself in music, drawing, color work, carving, etc. Active expression will develop the interest in such matters, will prompt inquiry as to the conditions of beauty, will thus lead to further understanding of artistic objects and to a deeper enjoyment of them all the while.

Emotional training. It was said above that the training of the feelings and emotions had a threefold object in view, — happiness, intellectual effort, and success and rectitude in action. Suggestions have now been made as to the realizing of the first of these ends ; the other two remain. Before going on with these, however, a few words should be said about the training of the emotions themselves, for upon their proper direction and control much of the realization of the threefold aim referred to will depend. Some of the emotional tendencies should be restrained, some encouraged, as was mentioned above. The great mold of the emotional life is experience itself. Let the consequences, individual and social, have their natural force. The child will soon learn to mitigate the rage expended on his playthings, if the broken ones are not replaced by others. He will soon feel to his great discomfort the social disapproval of his rash and passionate words and acts. The child must suffer if he would become strong, and master of his passions. If these unpleasant results, individual and social, are allowed to take their course, if they are even accentuated by further deprivations and social coolness, the undesirable tendencies will tend to be inhibited, and will not be so likely to harden into habits. On the other hand, the desirable emotional tendencies may be in the same manner encouraged. Let social approval not be withheld

from expressions of love and sympathy, from proper exhibitions of emulation, pride, etc., and even well-grounded fear and just anger. Let the individual advantages accrue from these desirable manifestations, and make the social approval, the smiles and the applause, and even the rewards, manifest to the struggling, experimental life of the boy or girl.

Further assistance may be given in this development by counsel and reasoning, by the right one in the case, after the passion shall have spent its force, and the child has become somewhat reasonable again. Sympathetic counsel is often most welcome, and the child may thus be fortified against the next trying experience. Again, the attitude of the child may be somewhat modified by such explanation as will perhaps change the object of the feeling, if that is desirable. It thus may be drawn off into a harmless or even a useful channel. Still another way of controlling emotion is to bring about a change in the situation and environment of the child. The object of his attention may thus be altered, and a new and desirable feeling tendency may take the place of the undesirable one.

In all such attempts to control and direct the emotional life, the real end and aim of the training should not be lost sight of. It is not the elimination of the emotional life that is desirable. The life of emotion is the real force of the individual. It should therefore be developed, even though this development does involve considerable weeding and inhibition. Love and sympathy need a measure of direction; pride and emulation need more, but one could hardly lead a normal and successful life without them; and even fear, anger, and jealousy have their proper objects and times of exhibition. None of the emotional energy of the individual need be wasted.

Intellectual activity as an aim. To turn now to the second of the threefold aims of the training of the life of feeling,—intellectual activity. The various feelings, desires, and emotions lead to action, and in order that this action may be suitable and satisfactory, it must be thought over carefully with all the conditions of self, other people, and physical environment taken into consideration. Hence the emotional life tends toward intellectual activity. Of course this thought activity cannot go on at its best when the emotions are at their height. They must settle down into what we have called interests, and these interests will be along the lines of the realization of the various desires. Love, sympathy, fear, emulation, etc. may be enlisted in the service of obtaining knowledge, may become strong moving forces or interests, as permanent as the conditions under which they spring up call for. Fear, anger, emulation, desire for ownership, and the like, draw the attention to their objects; investigation is carried on, new facts brought out, related objects noticed, relations discovered, and knowledge considerably advanced in the individual's mind on account of his being possessed by these feelings and emotions. There is no necessity that these fears, sympathies, etc. should go for nothing, if the teacher will but notice them and direct the attention and interest naturally resulting into mines of information. Plants, animals, the world of inorganic nature, laws, customs, political geography, and much else may thus be studied with the deepest interest and concern. Prompted largely by these emotional tendencies, and existing pretty strongly in human nature on its own account, is the feeling or emotion of curiosity. By proper direction it may be guided toward the gaining of desirable knowledge, and may thus be prevented from being exercised upon trivial and undesirable matters.

Useful and right action as an aim. Not only should the life of feeling be trained for the sake of lasting enjoyment and the furtherance of knowledge, but also for success and rectitude in action. By means of the proper conduct on the part of the individual, enjoyment of life is largely realized, while the furtherance of knowledge finds its meaning largely in successful and appropriate conduct. Feeling tends to issue in action, and the problem of its training in this connection is the problem of getting the feeling life to be the backer of efficient and desirable lines of conduct rather than of inefficient and undesirable. Here the teacher can appeal to the ambitious impulses, as was pointed out in Chapter IV, and can direct somewhat the interests of the student. By example and suggestion, desirable aims can be set up in the mind of the child, his attention may be called to them, and they may thus become his interests. If the thoughts of ends that will be of service are encouraged, and if these ends are within the reach of the effort of the pupil, he will seek to achieve them and will find his satisfaction in their accomplishment. The means employed will also give satisfaction because necessary to desirable ends, and the pupil will get into the way of being pleased with the efficient performance of acts that count. If such enterprises engross his attention and are his delight, there will be little room for the entertainment of ends and plans which are of minor value. He will be displeased with inefficient performance and will be the more pleased with efficiency. By degrees the child may thus get his feelings attached to the efficient performance, and so he will not be consumed with empty longings toward quixotic doings. For the same reason he will not take his pleasure in idleness, there being more satisfaction for him in accomplishment.

But it is the training of feeling toward rightness of

action that is most important. Other aspects of moral training are referred to in Chapters IV, VIII, and XIV; it is the feeling aspect which concerns us here. The training of feeling in moral affairs has for its object that the individual shall find his pleasure, his satisfaction, his delight in good rather than in evil. So will he hate all baseness, despise all vileness, esteem the pleasures of a good conscience, and be the ready servant of its dictates. This feature of moral training cannot be accomplished by itself. The training of instinct, impulse, and habit; of attention and interest; of conception, judgment, and reason; of memory, association, and imagination; and also of voluntary action, must be taken into the account and carried along in connection with the training of the feelings, if genuine moral training would be given the child.

The training influences are referred to more at length in the next chapter. There are the natural consequences of actions in terms of pleasure and pain; reward and punishment; imitation and suggestion; obedience to direction; the setting before the child, in story and biography, of concrete examples of right conduct, to be a source of inspiration and guidance; and the encouragement of feelings and acts of the right sort, which the child is actually feeling and performing.

The object in moral training from a feeling point of view should be a normal ideal individual, prompted to the best type of activity by the whole force of natural feeling. In this there would be the healthy and right sort of physical activity with its strong agreeable toning, the living out of the life of emotion in a harmonious, enjoyable way, efficient mental activity with its characteristic enjoyment, and vigorous and lively moral sentiments prompting efficiently to the right and noble in conduct.

Huxley, in his classic description of the meaning of a liberal education, brings out certain features of the function of emotion in education: "That man, I think, has had a liberal education who has been so trained in youth that his body is the ready servant of his will, and does with ease and pleasure all the work that as a mechanism it is capable of; . . . whose mind is stored with a knowledge of the great and fundamental truths of nature, and of the laws of her operations; one who, no stunted ascetic, is full of life and fire, but whose passions are trained to come to heel by a vigorous will, the servant of a tender conscience; who has learned to love all beauty, whether of nature or of art, to hate all vileness, and to respect others as himself. . . ."

REFERENCES

JAMES. Psychology, Briefer Course, Chapter XXIV.

TITCHENER. An Outline of Psychology, Sections 57 to 60, and Chapter XIII.

THORNDIKE. Principles of Teaching, Chapter XII.

MÜNSTERBERG. Psychology and the Teacher, Chapter XXI.

ANGELL. Psychology, Chapter XIX.

CHAPTER XIV

THE COMPLEX PROCESSES OF CONSCIOUS ADAPTATION: THE WILL

If one feature of our conscious lives can be singled out as of more importance than any other, that feature is the power of willing. These experiences of conscious action are common enough, and so well known that no one need mistake what is meant by the term "will." We have various words to name the different aspects of such experiences. Desire, wish, will, decision, determination, deliberation, — such are the words we constantly use, and such the experiences we constantly have. The will is commonly thought of, and rightly, as the central thing in a person's life; and those who have anything to do with the training of the young find the training of the will the most complex and most difficult part of their work.

Voluntary and involuntary action. We have already treated of the nature of conduct in so far as it exhibits impulse, instinct, and habit. The treatment of the nature of volition will complete the mental story of the life of action; that is, the work of the organism in adapting itself to the varied conditions of its life. Among these features of our active life there is a close relation, in that all our voluntary acts, as outward, physical affairs, are made out of impulsive, instinctive, and habitual activities as their raw material. The organism is, as we have learned, a decidedly active affair from the first. Through this early activity it acquires control over its movements and gets into more

or less habitual ways of doing things. When we *will*, it is no new species of action that we engage in. In willing and carrying out decisions, we employ those movements which are already more or less familiar to us in our instinctive and impulsive life. These acts must first take place in an involuntary way in order that we may use them in a voluntary way to carry out our purposes. On account of the involuntary performance the acts become familiar, and control over them is acquired.

Volition is thus dependent for its exercise upon our more fundamental life of action in impulse and instinct. Out of these in various combinations do our voluntary acts grow. After the discussion in Chapter IV, this point scarcely needs illustration. I decide to leave the piece of work on which I am engaged, and go off with my friend to play a game of tennis. Looking at the movements concerned in this voluntary act, it is not difficult to trace them back to their original simple elements in impulses, instincts, and the habits formed from them. How I come to make my decision,—that is another point, and one that we must take up for discussion before we get far. The actions themselves are, in the sense we have explained, secondary, and not primary, experiences.

In our life of action, from the simplest reflex to those voluntary movements which carry out decision after deliberation and effort of will, there are many degrees of consciousness and of “will” involved, and we may trace a regular gradation from the lowest to the highest. It is usual to make a general division of the series into those acts which are voluntary and those which are involuntary. The former acts are intended acts. We will to do them. We are conscious of an end or purpose, and seek to attain it. Involuntary acts are those which are not purposed,

which take place, not indeed against our intention, but simply without regard to any intention. Involuntary conduct has, perhaps, been sufficiently discussed in its general nature in Chapter IV.

Ideomotor action. There is a type of conduct on the borderland between the voluntary and the involuntary, however, which deserves mention both on its own account and on account of its use in understanding the nature of volition. This variety of conduct is called ideomotor conduct. Its name suggests its meaning. The sight of an object, for example, calls out the natural or habitual action connected with that object. There is a more or less complete consciousness of the object, its relation to the actor, the beginnings of movements with respect to it, a remembrance of its effects, etc., and lo! without more ado, the act is performed. The idea of the conduct, or some feature of it, is the "motor" in the case. It is certainly performed without any deliberation, without any explicit decision, and without there being any conflicting claims toward any other lines of conduct at the same time. When, in playing baseball, one has made a fair hit, one does not deliberate before running to first base. The running, or at least the starting to run, is ideomotor action. The greeting given to a friend whom one unexpectedly meets is usually a spontaneous ideomotor affair; so also in the picking up of a lady's handkerchief. Engaged in writing or talking, one becomes conscious of an object not in its ordinary place on his table, and without any break in writing or talking the object is straightened into its right place. In these cases, simply to have in mind an idea which has an established relation to conduct, is sufficient cause for the performance of the conduct. Here we have, in ideomotor conduct, a very clear case of the relation between an idea in consciousness and

outward action. The natural effect of an idea in consciousness is an outward act. That seems to be what the idea is in consciousness for.

Two questions about ideomotor conduct will lead us into what is more clearly voluntary conduct, or action after deliberation. These questions are, first, why do not our ideas always issue directly in conduct of the sort above described? and second, what further preliminary is there in the case of deliberately willed conduct? The answer to the first question is simple enough. Some of our ideas have no direct relation to conduct, and those which do have such a relation do not always issue directly in simple ideomotor conduct, because there are other ideas in consciousness, and perhaps conflicting ones. Our conscious life is not simple; it is complex and mirrors a complex situation around us. The idea of doing "this" is immediately met by the idea of doing "that." There is consequently a hold-up. Ideomotor action is now out of the question, and deliberation or inaction must ensue. Were it not for the appearance of the second idea, the first one would easily pass into action. It is its natural tendency to do so, and its being stopped or inhibited leads to inaction or, at least, to the temporary holding up of action by deliberation.

We are now in a position to answer the second of our questions, — what further preliminary is there in the case of deliberately willed conduct? This answer we shall give in the sections to follow. In doing so it will be necessary to point out the normal factors entering into conduct of the deliberately purposive sort, and to show what are the main features of experience in the life of volition.

The place in volition of ideas or images. In ideomotor action, as we have seen, the mere presence in consciousness of an idea or image having a certain relation to conduct is

sufficient to account for the act. This idea or image is not necessarily a full notion of the act about to be performed. Some feature of the situation presents itself in consciousness, and without any deliberation or conflict the appropriate action follows. In deliberate, purposive action the case is somewhat different. The difference is not, however, that the idea or image is absent. The more deliberate the action performed, — that is, the more fully its pros and cons are reflected on in contrast with some other possible act, — the more fully will the details of each proposed act come to mind. The more habitual the act and the more clearly ideomotor it is, the less necessary it will be to have in mind ideas of all the details of the performance.

Take the case of signing one's name. One may have an image of how the name will look when written, or perhaps only the sound of the name will be in mind, or it may be some motor imagery of how it feels to hold the pen and write that name. In many cases of such an act, it being so habitual an affair, the mind will probably be on the circumstances which give some further meaning to the signing of the name, — the letter one has written, the friend to whom one is writing, how soon he will get the letter, or some other phase of the whole experience of which the writing of the name is but a part. When a youngster is learning to write his name, or when any one is trying to perform a new and difficult task (like learning a new stroke in tennis), his mind is on the act itself. And even when the habit is fairly well learned, the way it feels in fingers, arm, etc., to do just that thing will be in consciousness to control the act. The way it feels will probably consist of images of the sight and kinæsthetic sort, and even of some actual kinæsthetic sensations as the muscles begin to set for the performance. The more familiar the act becomes,

the less watching it needs. But in order to perform an act voluntarily, there must be some idea of the act, or of something connected with it, to guide the performance. The sight of the first baseman is sufficient guide for the throw by the shortstop. The small boy will have his mind more on the act of throwing. For the experienced player how it feels to throw practically drops out of consciousness; and even the sight of the first baseman may be but a minor, or fringe, aspect of consciousness, the mind being given to the meaning of the whole situation, or, it may be, to something even more remote from the act of throwing. It is thus rather difficult to lay down any rule as to just what ideas must be in consciousness as the forerunners of willed conduct, because the variations are so great.

In deliberation concerning action, ideas or images differing, conflicting, alternating, come to mind. The motor currents are held up. The brain centers concerned inhibit their natural expression. There is a condition of repressed excitement. We hesitate before we act. We get fuller ideas or images about possible courses of conduct in the case. Many other ideas associate themselves around these possible courses. We are said to be thinking the matter over, deliberating. After a longer or shorter time, perhaps a minute, perhaps several months, the idea of one of the possible courses of action in the case comes out strong and clear, the different conflicting ideas gradually vanish, and we will that course of action which thus becomes so prominent in mind. The mental conflict is over. We have chosen our course of conduct. The inhibition in the brain centers and the tension are at an end. The nervous current speeds out along those courses that govern the act or set of acts we have decided upon. How this condition of conflict, of deliberation, passes over into decision will appear more fully

as the discussion goes on. What we wish to emphasize at this stage is that the prominent feature in deliberate volition is the presence in the mind of full, strong ideas or images. These full, strong ideas are the necessary condition of the volition. They are even more prominent here, fuller, and more numerous, than in ideomotor action. The intellectual element, then, in volitional experience is very important. The thought of the end to be realized, the means to be used for its realization, the advantages to be derived therefrom, — these images and ideas and others more or less closely related seem to dominate the person, and are the main factors in decision.

Volition in relation to the attention. The condition we have just described, of the presence and course of the ideas in deliberation and decision, may be even better explained from the point of view of attention. In ideomotor action the idea which leads to the action may be more or less prominently before the mind. It may be in the fringe of consciousness while our main thoughts are on other things, as in the case of straightening the article on the table. Or it may be all-absorbing for the moment, as in the case of running to first base. In either event the whole attention available for taking care of the act under the circumstances is given to the idea. In deliberate volition, during the deliberation, the attention is given now to the one course, and now to the other. Pros and cons of both courses are brought out into the light. The mind focuses itself upon the various features of the possible courses in turn. Sooner or later one course or the other becomes the brighter and stronger. The attention is given to that at the expense of the other. When the attention is completely given to the one course, lo! we have decided. The giving of the whole attention to this one course, at the expense of all

conflicting, hindering courses and considerations, is the decision in the case. We may say, then, that one of the most prominent features of the process of deliberate volition is the play of the attention; that, in fact, volition is but a case of attention, the act being decided when one course receives our whole attention at the expense of the other possible courses.

Desire and its relation to volition. The process of willing may also be described in terms of desire. Here we begin to see the part played by feeling in volition. The experience of desiring something is so common and well known that any attempt to define the term "desire" would very likely tend to obscure its meaning. Our desires are based upon our original impulses and instincts. As we have already seen, when a natural tendency is once exercised, the sensible results live in memory. After that we are not blind in the case. We know what we want. We think of the end, picture in our minds the means and circumstances, and in certain situations are in a state of desire with respect to that end or purpose. Now any course of action, to be seriously entertained and deliberated upon, must be more or less intensely desired. It must take some hold of us, strike into the roots of our being as it were. Our deliberation becomes, in this way of looking at the case, a conflict of desires. It is not always so cool and reflective an affair as it might seem from the description in the last two sections. The conflicting courses of possible action are both more or less desired. The desires are more or less calm and steady, more or less clamorous. They may represent the flaming out of a single appetite, or the deep-set claims of prudence or of duty. When the feeling element in the case is very strong, fair deliberation is difficult. If, however, there is sufficient balance in the person, there is

an impartial hearing of the conflicting claims. If the person is not carried off his feet by the sudden strength of some one desire, the ideas of the alternative course in the case may come forward. The attention may be given to this second course in equitable measure. The deliberation is, however, in this sense but a balancing of desires to determine which, after all, the person most deeply wants. It may be for good or for ill that he decides, but his decision is none other than his own nature coming to its expression through the medium of the conflict of desires.

Pleasure and pain in volition. We have thus seen that into many deliberations and decisions, at least, considerable feeling enters. This element should be spoken of in terms of pleasantness and unpleasantness. Attaching to the thoughts of the ends in view there will usually be something of agreeableness or the contrary. This may be quite marked or practically, if not entirely, absent. Other things being equal, we tend to entertain the pleasant and banish the unpleasant from the mind. The more a course of conduct takes hold of us, the deeper it goes into the depths of our lives, the greater will its agreeableness probably be. As we have seen, both in the case of ideomotor action and in the case of deliberate volition, the presence of the idea of a course of conduct is the main precedent of willed action. These ideas are in accord with our original and acquired tendencies. They represent desires, and these desires in turn have in them more or less well-marked affective toning. So that in many of our acts, but by no means in all, the pleasantness or the unpleasantness of the courses of conduct deliberated upon seems to have much weight in the decision. The feeling element is not, however, so necessary or characteristic a feature of the volition experience as is the intellective, the ideas or images themselves waxing and

waning. It is just these ideas, representing the act in the situation, which are pleasant or unpleasant. One's action is not determined by the pleasantness or unpleasantness, nor apparently are these directly desired. They seem rather to be the indexes of whether or not the self is becoming well adjusted to the situation in hand. The act chosen will be that which seems best to satisfy the self, but it does not seem to be chosen because of its greater agreeableness.

In so far as one desires an end or looks favorably on a course of action, one has what is called a *motive* for conduct. These motives are the factors in the deliberation. The real motive in conduct, the explanation afterwards, is that desire which finally stands as the real expression of the person. That it is which, under the circumstances, is decided upon or willed.

Interest and volition. Instead of using the term "motive," we might speak of one's interest. As was pointed out in Chapter VIII, the attention is given spontaneously to what interests us. It is given with effort to what is a nonagreeable means to ends which appeal to us. What determines volition is attention. What determines attention is interest nearby or remote, — that is, matters of immediate concern or of derived moment. These are matters desired. In case the attention to a proposed course of action is voluntary, effort is involved. The great conflicts of a person's will are frequently between immediate interests and desires, — those things which claim the attention spontaneously and lie along the line of least resistance, — on the one hand, and, on the other, the means to remote but desirable ends, — those acts which seem colorless, uninteresting, and even hard and repulsive, where something heroic is called for, where the attention to them and consent to their presence in

mind and to their performance are only given with great effort. Effort is often called will power, and will be spoken of below.

Relation of habit and association to volition. Our voluntary acts are, for the most part, of a regular, to-be-expected sort. Our conduct begins very early in life to come under the dominion of habit, and this dominion increases with the years. Even when we do novel things, or accomplish familiar results in novel ways, we are using all the while in the performance old habits in new combinations. With respect to our rooms, our clothes, our friends, and all else about us, we get into practically fixed ways of response, as we have seen in our discussion of habit. Our voluntary actions, then, are in great measure tied down to our habitual, customary ways of doing.

In the same way our associations dominate our actions. Under certain circumstances our acts are practically settled for us on account of the associations between our ideas and feelings and certain movements. Professor Thorndike says: "Given any mental state, that movement will be made which has been connected with it or part of it most frequently, most recently, in the most vivid experience and with the most resulting satisfaction, and which has been so connected with the general system of thought and conduct present. We say five when we think five; we take off our clothes when we decide to go to bed; we shake hands with a caller; we pat a dog; we stroke a kitten; we put a hat on our head and a coat over our shoulders — because in the past we have done so and without discomfort." (*Elements of Psychology*, pp. 274-275.)

We thus see that for the most part we are practically under the domination of habit and association in the great range of our experience of willing.

“Will power” in volition. It would be a mistake, however, to neglect the element of reform and initiative in the case of volition. We can perform novel acts, learn to do new things, break up old habits, devise unusual ways for achieving familiar purposes. We feel our responsibility not only for being reliable, true to our natures, but also for changing our ordinary ways of doing when occasion calls for it. Old habits may have to be broken off and better ways of doing our work found.

We have seen that our voluntary acts are always secondary and not primary affairs, and, in the preceding section, that, not only in its parts but even as a whole, our voluntary conduct tends to be guided by habit. We are, however, living in a world where new situations are always arising, and where new suggestions are constantly being made. These novel circumstances awaken us to attempt to meet them advantageously and well. And again in our serious work, as in our childhood's play, we try, try again, until we have achieved what we desire. Our wills are capable of initiative, then, in gradually giving new direction to energies which have already been more or less thoroughly molded into habits.

When these new circumstances arise, — perhaps the solving of a problem in geometry, the learning of a new stroke in tennis, or the escape from a dangerous predicament, — there seems to come a challenge to the will. The old habits are not enough now. They have to be modified and refitted, so that the new end may be realized. The mental experience, besides that of zest and unrest in the struggle, seems to be mainly that of active attention, in keeping under thorough control in consciousness both the end to be attained and the means, selected gradually and with care, which seem to be fitted to achieve the end. The end must

be kept in mind, not in the center of consciousness all the while, but at any rate near by. Many associated ideas and habits must be examined and tested as to their fitness to be used for the purpose. This selection and discrimination by the active attention of means with respect to a new end or purpose is the element of reform and initiative in the case of volition. This power of initiative reveals to us the nature of the will very intimately. Upon this power, in connection with the force of habit and association in our voluntary conduct, does all progress depend. It must be reckoned with decidedly in training the will.

To follow the line of duty, or to toil and endure great hardship for the sake of an ideal or a remote interest, involves the effort of voluntary attention. Here it is that the so-called will power must be invoked. Such cases are really of the same sort as what we have just called initiative and reform. They mean strength of will, capacity for taking pains, strenuous exertion, conscious control over action with much effort. They constitute the supreme aspect of conscious processes making the finest adjustments of the organism to the conditions of its highest life.

Imitation and suggestion in volition. There is another feature of the volitional life, closely connected with those mentioned in the last two sections, which ought to be mentioned; namely, the part played by imitation and suggestion in our voluntary life. In our conduct, both of the habitual and associative sort, and in initiative, we are strongly influenced in the ways of imitation and suggestion. From the first we are social beings, and are observant of the ways and doings of those about us. These we tend to copy. We emulate the deeds we admire, and would make them our own, adapting them in perhaps a more excellent way. The force of example is a very strong one from earliest days.

By examples, by the acts and suggestions of others, the attention and interest are caught and held. If no conflicting ideas or images are called up, we proceed either with ease or with difficulty to perform the suggested act. If other and conflicting ideas are aroused, the struggle of deliberation and decision takes place. In either case we are influenced, the will directed, habits formed, and character molded, by this great ever-present force of example.

Recent studies in social psychology and in the phenomena of hypnotism not only have brought to light extreme cases of suggestion and suggestibility, but have shown that the influence of suggestion is exceedingly great in everyday, normal experience. In hypnotism the patient is in a relation of extreme receptivity to the operator. Whatever the suggestion is, it results in practically ideomotor conduct. Even when the suggestion is made that next day, after the hypnotic state is over, the patient will perform some trivial act, it is usually effective; for when the proper hour arrives the patient, without knowing why, carries it out. Such facts go to show the natural course of an idea when others do not inhibit it. In some cases of hypnotism there may be conflict, but in many of these cases the suggested course of action is victorious over the habit, or "stubbornness," of the patient. This is somewhat like an ordinary instance of will, with an unusual premium in the way of suggestion put upon one course of action. In ordinary life we do not act as do hypnotized patients; but in all kinds of ways, more or less subtle, we are constantly, directly or indirectly, having our conduct determined by the suggestion of others.

Even more curious and important than the cases of hypnotism are those of crowd or mob influences, or in milder form the influence of society on the individual's thoughts

and actions. It is not practicable to enlarge here upon the conditions, in the individual and the groups of which he is a part, which are most productive of extreme results by suggestion. Ross, in his "Social Psychology," mentions a case from the *Psychological Review* (Vol. VI, p. 407). "A professor of chemistry announced to his auditors: 'The bottle which you see before me contains a chemical with a strong and peculiar odor. I wish to see how rapidly the odor will be diffused through the air and will therefore ask each of you to raise the hand as soon as the odor is perceived.' With face averted he then poured the liquid over some cotton and started a stop watch. In fifteen seconds most of those in the front row had given the sign, and by the end of a minute three fourths of the audience claimed to perceive the smell. Yet the bottle contained nothing but distilled water, and the professor had been measuring the power of suggestion and not the diffusibility of an odor."

Ordinarily, indirect suggestion seems to be more effective than that which is direct, although in hypnosis the reverse would seem to be true. When anything is "in the air" or comes to one with a certain prestige, when it is felt to be favored by those in authority, when it is the fashion, when the "upper classes" do it, when "everybody" thinks or feels or believes in a certain way, then the suggested belief or act or mode of behavior is likely to be chosen. The individual is unconsciously determined by the beliefs and ways of the multitude. He feels of little account in the throng. He takes on the craze or fad. What he would not heed if left to himself he is susceptible to on account of his social solidarity with others. Financial crazes, booms in real estate and mining shares, extreme revival phenomena, epidemics of lynchings, of end-of-the-world beliefs, stampedes, massacres, crusades, witchcraft beliefs and persecutions,

dancing manias, Klondike enthusiasms, — all these and many other more or less extreme phenomena testify to the wonderful effect on belief and action of social pressure. Just where normal social influence, which enlightens both beliefs and deeds, gives way to the extreme forms and becomes abnormal would be difficult to figure out. In describing volition the whole story could by no means be told without some allusion to the important influence on belief and decision of suggestions from individuals and from society in normal and in unusual conditions.

Making up the mind. Deliberation and decision are often referred to as “making up the mind.” The real meaning of the phrase seems to be, bringing order out of the chaos of conflicting ends, desires, interests, and motives. We think matters over, we give each its proper place. In this process there is a waxing of some motives and a waning of others. Each interest is a partial expression of the self. Were this not so, it would be no motive to us; it would not claim the attention, nor be taken into the account. As we deliberate, it becomes clearer what we really want. One course of action grows clearer, or claims the attention more than the others. One motive comes to dominate. One interest seems to swell, until others are crowded out. The relative merits of competing desires become apparent, and at last the mind is made up. The decision is not an arbitrary selection by the will without regard to motives. It is the natural coming to its rightful position of domination of that course of action which under the circumstances best expresses our ideals, our habits, and our desires. It is the free and natural expression of the entire self. In a completely deliberated decision no factor is left out. Ideas, feelings, habits, motives, interests, desires, and effort all play their respective parts.

We have now discussed, as fully as seemed practicable, the various factors of the process of volition, and the nature of the will. The place of ideas and images; of feelings, interests, motives; of attention, habit, association, initiative, effort, imitation, and suggestion has been indicated. In doing so we have not discussed directly the question, What is the will? We have found no one specific item in the volition process that could well be so named. As Angell puts it, "*The whole mind active*, this is the will" ("Psychology," p. 437). The will represents the whole consciously purposive life of the person. All the other features of consciousness enter into it. Ideas, feelings, desires, habits, aspirations, — all are indissolubly bound up in voluntary conduct. Will is not a faculty or function separated from the rest of our conscious life of memory, imagination, emotion, etc. It is all these conscious processes working together for the intelligent direction of conduct. Volition is not separate from motive and impulse, but is a fusion of all the tendencies of the mind superintending and controlling action.

Training of the will. If the foregoing is a correct account of the nature of the volitional processes, certain corollaries of a practical sort seem to follow, answering questions as to what it means to train the will, and how, directly or indirectly, the will may be influenced.

1. The first important feature in training the will is the help furnished by supplying the mind with a useful body of ideas. As we have seen above, we deliberate, decide, and act in accordance with the ideas which are attended to. A worthy and useful stock of ideas is essential if the will and character of the person are to be of the most desirable sort. The first and fundamental problem of those who undertake the training of the will is that of so assisting and guiding the youthful mind that it may acquire such ideas.

These ideas are to be derived from many sources. From story, biography, history, the drama, the whole account of man's individual and social life, come thoughts which are essential in the formation of worthy and useful ideas about conduct. From the study of the human body, of plant and animal life, of the world as described in the earth sciences, come ideas without which the will is dim in its vision and unsuccessful in its struggle. From the more formal studies, such as arithmetic, grammar, and technics generally, are derived ideas of means to the accomplishment of ends, — ideas which enlighten the mind and so guide the will. And from all the "expression" work of the schools, comes a unique training in the exact formulation of ideas, as well as an attachment of these ideas to the proper modes of expression. In these studies, which supply a body of useful and worthy conceptions of conduct, teachers have the greatest means under their control for molding the wills and characters of their pupils. In all the ways of instruction inside the schoolroom and out, from the give-and-take of social intercourse, wherever knowledge of the self and of the world of people and things about us may be had, can the will be very thoroughly and fundamentally trained by acquaintance with the better and worse in human conduct.

In this matter of training the will indirectly by means of inculcating knowledge, it should be borne in mind that the precept is not enough. The ins and outs of experience must be known by the individual, or foreknowledge of these things will not bring him profit. Many a mistake in conduct would be avoided if the bearings and consequences of certain ways of conduct were thoroughly known. The dearly bought experience may sometimes be avoided, not by empty precept and warning indeed, but by a thorough knowledge, a worthy and useful body of ideas,

with which the schools and the homes ought to supply young people before the serious situations confront them.

2. The second great feature of the training of the will is the building up in the mind of the proper interests and the habit of giving the attention to useful and worthy purposes. It is not enough that a desirable stock of ideas should be in the possession of the youthful mind. We know the better and oftentimes follow the worse. The idea that is dwelt upon, and fondly dwelt upon, is the idea in control of the will. Attention is the secret of will. All the ways which teachers and parents know for directing the interest and attention should be invoked in this matter of the training of the will. Voluntary action is the end and aim of all teaching and training. Interest and attention are the forerunners of conduct. Only that conduct which is squarely based on these in a genuine way will be the permanent type of conduct. Only by the genuine securing of these can character be influenced. Only those things which strike deep into the roots of the nature of the young can so engross their genuine interest and attention that permanent results in the way of conduct and the formation of character can be reached. This is a final reason for conducting all training work along the lines of interest and attention as set forth in Chapter VIII. That which genuinely interests, that which claims the undivided attention, that it is which guides the will and makes the character. Hence the necessity of securing, along with a worthy and useful body of ideas, a desirable series of interests in which the attention may be absorbed and along the lines of which the will may direct our voluntary conduct.

3. Another important feature of the training of the will is the establishing of a firm association between ideas and actions, or, in other words, the forming of a good set of

habits. This feature has been touched upon considerably in Chapter IV. Wherever action of the right sort can be obtained so as to follow directly upon certain thoughts, the greatest encouragement should be given for its performance. This is, indeed, a difficult and an important feature of will training. But if the habit or association between idea and action is once formed, the battle is practically won, and the volition will take place along these well-developed lines. (See page 291.)

All ways practicable for the performance of actual good and useful conduct should be provided. The actual social life in the home, among young friends, on the playground, and in the school, is a great educator in this respect. Expressions of ideas and feelings are constantly going on here, and are somewhat under the control of parents and teachers. If the school is a real social group, if it is carried on in the simple naturalness of genuine human relations, then there will be a real training in the actualities of human intercourse which will hold as well outside the school as in it. There will be real enlightenment and thoughtful and generous responses. Ideas and actions of the kinds thus called for will become firmly associated, and the will so trained. Right and useful expression should be encouraged in every way possible. Here as elsewhere the guidance should be in the background, and the lives of the boys and girls left as free and spontaneous as possible. From the discussion above, it was seen that, for the normal mind, indirect suggestion rather than direct is most effective. It is thus the individual's own, apparently, rather than the will or advice of another, and becomes the more easily grafted. Again, in the actual individual conduct of the child in school as well as at home can much be done. How awkwardly one boy plays ball,

and how cleverly another! Where has the difference come in? Allowing for some difference in natural aptitudes, it is the practice and the coaching that count. Modern schools are much more efficient in the matter of connecting impression or ideas with expression than were those of a past generation. All kindergarten, gymnastic, and drawing exercises, and others of like nature, give teachers a wonderful opportunity. From the earliest age in school, up through to graduation, the training of the body into good and useful habits can go on. The eye, the hand, and the whole body can be the clever instruments of the will. The conditions under which these expressions are made, giving scope to the free, active life of the boy and girl, render doubly sure a firm connection between the idea of the thing to be done and the desire and ability to perform the act. The habit of satisfactory achievement becomes paramount, and conscious direction comes to its own.

4. Another very important feature of the training of the will has reference to its strength of purpose or power of initiative. There seems to be a fundamental difference in native force as between different pupils. Some boys are so much more ambitious than others. Some have a greater degree of active attention. Some are so much more persevering. While teachers and parents have to recognize and admit these native differences, the desirable qualities in this connection can be in great measure encouraged in all. Undoubtedly the various exercises spoken of in the preceding section can be of much use here. If the child is given a chance, if appeal is made to his ambitious impulses, if he is thrown on his own resources, though not to the extreme of utter failure, his budding manhood will assert itself. There is great danger of overtaxing him, thus making him unduly weary of his task. If the problem is

really too much for him, he will naturally become discouraged in the matter of putting forth energy. It will become drudgery, and "balkiness" with respect to new tasks will be a likely result. If on the other hand the genuine effort leads to satisfactory results, if the price paid has the reward of success, then the ideal, and in a measure the habit, of hard, aggressive effort will be formed. The natural rewards of effort in the shape of success become the great factors in the case. The saving from failure and helping to success on the part of the teacher should be most sparing, and the subject of careful thought. The same may be said of reward and punishment for success and failure. Failure from lack of effort should be carefully distinguished from failure after effort. Lack of effort has its natural penalties, while aggressive, persevering work has its natural rewards, and these become the great promoters of initiative and strength of will.

The means of training spoken of in connection with the development of a worthy and useful stock of ideas and the building up in the mind of a series of proper interests, may be made much use of here. The knowledge of what men have done and can do, the knowledge of the means they have employed, the differences between successes and failures, the appeal of the example of others, especially if adapted to the lines of the developing interests of the pupil, — all these will do much to strengthen the initiative and perseverance of the youth. The teacher's own attitude toward these things will have a great influence. Not that much can be done by way of moralizing. The pupil will with great facility catch the teacher's enthusiasm for a concrete case of patient, strenuous, and even heroic effort for a worthy end. Such means as these should be used at all times, and great care should be taken to adapt them

wisely to cases in hand. Strength of initiative and perseverance do not come by command or even by entreaty, but, in so far as may be, by the natural ways of which we have spoken. It is true that the youthful mind, year by year, will have as objects of admiration people and forms of enterprises which to the adult may seem strange and even ludicrous. But out of these, and out of many known and unknown interests and enthusiasms, will his ideals take shape, and by these in turn will his ambitions be fired.

5. Some readers may think that the real difficulty in the training of the will has not as yet been touched upon, — namely, the matter of discipline. Yet, on further reflection, what is all the training referred to above but development and discipline? Development and discipline are found in the actual contact of the active self with life's conditions in the school, the home, and elsewhere. In knowledge, in interest and desire, in experiencing consequences, in forming habits and associations, in the struggle for success, in imitation, and in conflict is the will being trained. A "broken will" is an unlovely ideal. Such a will is likely to exhibit either lack of force, coupled with mechanical compliance, or the latter with the native forces expended undesirably. The problem of discipline is rather the problem of enlisting the native forces of the individual along lines which are at once the fullest expression of the life of the self, and the most desirable from a social point of view.

To conceive of discipline, however, in the sense of reward and punishment by teachers or parents as the chief means of training the will does not seem to accord with the doctrines of modern psychology. No doubt there is a place for such discipline, but surely it is of minor importance.

There are, as Herbert Spencer and others have shown, many natural rewards and punishments, — that is, the

natural pleasant and unpleasant consequences of conduct viewed in its individual and social relations, successes and failures in youthful efforts, — and these are, as we have seen, of the greatest influence in molding future action. These consequences should not be interfered with unless absolutely necessary, and the duty of those guiding the youth in this respect would seem to be that of supplementing, wherever necessary, this so-called natural discipline.

By whatever method the discipline is carried on, there is the greatest necessity for realizing that it is individual personalities and temperaments that are being dealt with. Such discipline as we have spoken of need not be of the “soft” order. Firmness and reasonableness can go together. The natural penalties of misconduct can be enforced with as much of inexorableness as can arbitrary penalties. The great task of the teacher in this connection is to discover just what are the natural rewards and punishments of conduct good and bad, in order that the pupil may reap in his individual nature, and as a member of the society (that is, the school) in which he is placed, the natural results of his conduct.

The training of the will must, then, be engaged in under the guidance of these five features. According to the first will the knowledge and ideals of the youth develop, giving possibility of intelligent and worthy achievement. According to the second will he become absorbed in those things which will make his life and conduct worth while. According to the third will situations call out proper responses and in a genuinely effective way. According to the fourth will the youth develop all that strength of initiative, determination, and perseverance of which he is capable. Finally, according to the fifth feature of will training as we have spoken of it, will the youth become disciplined by contact with teachers

and others and by the force of circumstances, so that he will respect the rights of others and have a proper regard for his own ambitions and his own duties.

Of these features the third is probably of greatest practical importance, since the will becomes genuinely trained only through the actual acquirement of habits, which in turn depend for their formation upon the real activities of the individual in adjusting himself to the conditions of his life, —

Machinery just meant
To give thy soul its bent,
Try thee, and turn thee forth sufficiently impressed.

REFERENCES

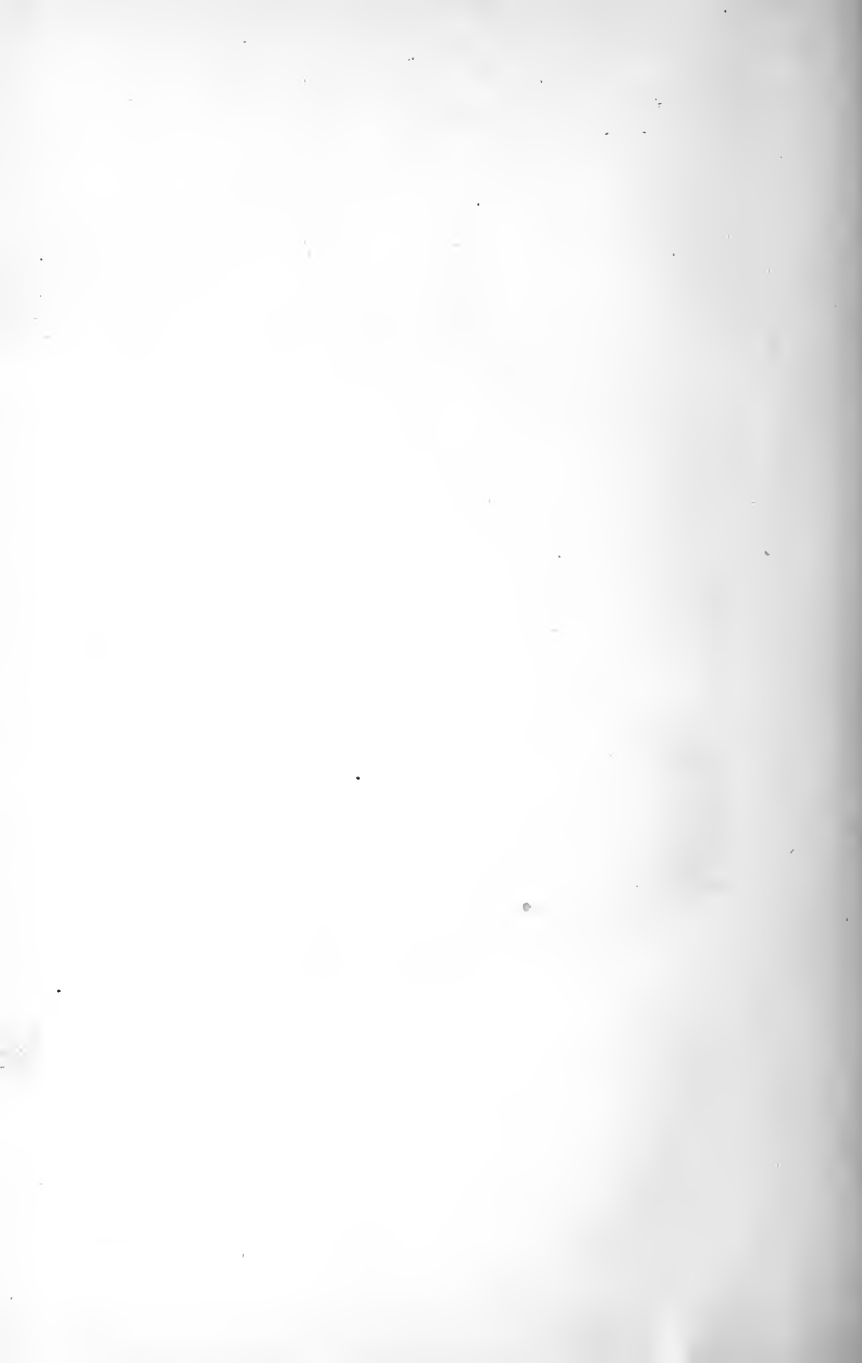
- ANGELL. Psychology, Chapters XX, XXI, and XXII.
 ROYCE. Outlines of Psychology, Chapter XV.
 DEWEY. Psychology, Chapters XVIII and XXI.
 JUDD. Psychology, Chapter XIII.
 JAMES. Talks to Teachers, Chapter XV.

INDEX

- Abnormal psychology, 7
- Accommodation in nerve-cell functioning, 50
- Affection, attributes, 142; compared with sensation, 143; definition, 144
- Affective qualities, conditions, 148, 152, 155
- Affectively toned idea, 146
- Afferent nerves, 37
- After-images, 94
- Animal psychology, 7
- Articular sensations, 102
- Association, of ideas, 177; physiological conditions, 179; mental conditions, 182; secondary principles, 187; practical and educational applications, 190; relation to volition, 291
- Attention, definition, 156; degrees, 158; varieties, 159; duration, 161; range, 164; as analysis, 166; as synthesis, 166; educational importance, 169; securing, 170; habit, 176; in judgment, 240; in reasoning, 248; in volition, 287
- Automatic acts, 53
- Axone, 33
- Brain, structure, 40
- Brain-cell properties, 48
- Brightness qualities, 91
- Central nervous system, 37
- Cerebellum, 41
- Cerebrum, 43
- Child psychology, 6
- Cognition, 24
- Color contrast, 94
- Color qualities, 92, 93
- Color square, 92
- Color vision, theory, 96
- Colors of spectrum, 91
- Complementary colors, 93
- Conation, 25
- Concept, nature, 232, 235; origin and growth, 236; relation to judgment, 240; use in reasoning, 246; training in formation, 249
- Conductivity of neurones, 47
- Conscious states connected and personal, 20
- Consciousness, definition, 17; features, 17, 27; function, 18; in constant change, 19; selective, 21; factors, 22; degrees, 157
- Contiguity, association by, 188
- Contrast, association by, 187
- Corpus callosum, 42
- Cranial nerves, 36, 37
- Dendrite, 33
- Desire and its relation to volition, 288
- Discipline in will training, 303
- Discrimination, 166
- Duration as an aspect of time experience, 204
- Ear, structure, 98, 99
- Efferent nerves, 37
- Effort, 159, 160
- Emotion, obvious features, 259; mental factors, 261; expression, 263; function, 266; educationally considered, 271
- Emotional situations, 260
- Emotional training, 275; aims, 273; happiness as an aim, 273; intellectual activity as an aim, 277; useful and right action as an aim, 278
- Expectation as influencing perception, 123
- Experimentation in psychology, 7

- Extent of movement, perception of, 121
- Eye, structure, 95
- Feeling as a factor in consciousness, 25
- Feelings, classification, 146; sense and ideational, 146, 147; simple and complex, 148
- Fissure of Rolando, 42; of Sylvius, 42
- Forced attention, 160
- Habit, meaning, 56; physiological basis, 56; relation to instinct, 61; formation from impulses, 63; as nerve functioning, 69; uses and training, 71; practical and educational applications, 75; influence on perception, 123; relation to volition, 282, 291
- Hallucination, nature, 129
- Happiness as an aim of emotional training, 273
- Harmonization a property of brain cells, 50
- Ideational feelings, 146
- Ideomotor action, 283
- Illusions, nature, 127
- Imagery, nature and source, 213, 214
- Imagination, relation to memory, 195, 196, 211, 221; definitions, 196, 211, 212; material, 213; function, 214; in children, 216; forms, 217; constructive, varieties, 219, relation to thinking, 221; relation to association, 221; culture, 224; development by use, 226; results of development, 228
- Imitation, in habit forming, 67; in volition, 293
- Impulse, compared with instinct, 59; in formation of habit, 63
- Inhibition as a property of brain cells, 51
- Instinct, nature, 57; term used in two senses, 58; nervous basis, 58; compared with impulse, 59; in habit forming, 61
- Intensity of sensations, 104
- Interest, as influencing perception, 123; relation to attention, 160, 167; genuine and false, 167; in terms of feeling, 168; educational importance, 169; securing and awakening, 170, 174; in volition, 290
- Introspection, 6
- Judgment, relation to the concept, 240; analytic, 241; synthetic, 241; training in connection with, 253
- Kinæsthetic sensations, 103
- Lobes of the brain, 42, 44, 45
- Localization of brain function, 43, 44, 45
- Location, perception, 117
- Making up the mind, 296
- Medulla, 38, 41
- Memory, as one of the ideational processes, 195; compared with imagination, 196; definition, 196; phases, 197; training, 207
- Mental conditions of association, 182; of retention, 198; of recall, 200; of recognition, 202
- Mental development, 27
- Mental elements, 23, 85, 142
- Mental factors in emotion, 261
- Mental facts, nature, 1; how obtained for study, 5
- Moral sentiments, 269
- Motive in volition, 290
- Motor nerves, 37
- Muscular sensations, 102
- Nervous system, general function, 32; gross parts, 34
- Neurone, 33; properties and functions, 47
- Noise, 97
- Observation, training in capacity for, 132
- Observation in psychological study, 6
- Organic sensations, 103

- Pain sensations, 102
- Perception, compared with sensation, 87, 110; definition, 109; analysis, 111; problems, 112; conditions, 113; of space, 116; as mental reaction, 126; functions, 130; training in, 132
- Peripheral nerves, 37
- Physiological conditions, of habit, 56; of perception, 113; of affection, 151; of association, 179; of retention, 199; of recall, 200; of recognition, 202; of emotion, 262
- Plasticity, a property of brain cells, 50; the basis of habit, 56, 69
- Play, 68
- Pleasure and pain in volition, 289
- Pons Varolii, 40, 41
- Present time, 204
- Pressure sensations, 101
- Primary fusion, 182
- Principal colors, 92
- Pseudo-interest, 167
- Psychology, explanation of word, 1; provisional definition, 1; problems, 8; practical applications, 12
- Reacting function of neurones, 48
- Reasoning, practical nature, 243; material used, 244; compared with association, 245; use of concepts, 246
- Reasoning process, 243; attention in, 248
- Recall, conditions, 179, 182, 199
- Recognition, nature and conditions, 200
- Reflex acts, 54
- Repetition as condition of retention, 198, 208
- Retention, conditions, 198
- Sensation, definition, 86; compared with perception, 87, 110; classification, 89; attributes, 89, 106; functions, 106; compared with affection, 143
- Sensation elements, 85
- Sense feelings, 146
- Sensitiveness as a property of neurones, 47
- Sensory nerves, 35
- Sentiment, classification, 267; compared with emotion, 268; educationally considered, 271
- Sight sensations, 90; stimulus, 95
- Similarity, association by, 187
- Size and shape, perception of, 120
- Smell sensations, 100
- Social environment, 171
- Sound sensations, 97; stimulus, 97
- Space perception, 116
- Spinal cord, 37
- Spontaneous attention, 160
- Succession as an aspect of time experience, 204
- Suggestion, in habit forming, 67; in volition, 293
- Symbolic imagery as a feature of the concept, 233
- Sympathetic nervous system, 46
- Synapsis, 40
- Task of psychologist, 11
- Taste sensations, 99
- Teacher, psychology and the, 13
- Temperature sensations, 101
- Tendinous sensations, 102
- Thought process, 232; training and development, 248
- Tones, 97
- Visual sensation qualities, 93
- Volition, place of ideas or images, 284, 297; relation to attention, 287; relation to desire, 288; pleasure and pain as factors, 289; place of interest, 290, 299; relation to habit and association, 291, 299; will power, 292, 301; imitation and suggestion, 293
- Voluntary action in relation to involuntary, 281
- Weber's law, 105
- Will power in volition, 292, 301
- Will training, 297
- Word imagery, development, 226





JUN 30 1918

One copy del. to Cat. Div.

JUN 30 1911

LIBRARY OF CONGRESS



0 020 198 911 5